

OUTSIDE MACHINERY STANDARDS

FINAL REPORT 8

WORK MANAGEMENT MANUAL

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TASK ES-8-21

OUTSIDE MACHINERY STANDARDS - FINAL REPORT

**THE NATIONAL SHIPBUILDING
RESEARCH PROGRAM**

Task ES-8-21
Data Development of Detail Standards
For Outside Machinery Operations

CONDUCTED T:

Industrial Engineering Department
Ingalls Shipbuilding Division
of Litton Systems, Inc.
P.O. Box 149
Pascagoula, Mississippi 39567

December 1983 through January 1985

FOR:

Bath Iron Works Corporation
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Bath, Maine 04530

The Society of Naval
Architects and Marine Engineers
Ship Production Committee
Sp-8 Panel on Industrial Engineering

The U.S. Department of Transportation
Maritime Administration

PREFACE

This project was performed as part of the National Shipbuilding Research Program, under subcontract to Bath Iron Works Corporation. Funding was provided jointly by the Maritime Administration (MarAd) and the U.S. shipbuilding industry. Administration of this project was through the Society of Naval Architects and Marine Engineers (SNAME) Sp-8 panel on Industrial Engineering. Performance of the project was by the Industrial Engineering department of Ingalls Shipbuilding.

It is noteworthy that this was the first standards development project under the National Shipbuilding Research Program funded by MarAd that involves shipboard activities.

The time standards in this project were developed using the Maynard Operation Sequence Technique (MOST). MOST is a predetermined motion time system.

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INTRODUCTION

In December of 1983 Ingalls Shipbuilding assumed an active part in the Maritime Administration's Ship Producibility Research Program. At that time the Industrial Engineering department at Ingalls began to work on Task ES-8-21, the Data Development of Detail Standards for Outside Machinery Operations. The purpose of this project was twofold. First, -it was to provide the shipbuilding industry with a set of universal standards for Outside Machinery operations. Second, it was to identify specific areas where methods improvements could be made to benefit both Ingalls and the U.S. Shipbuilding industry.

The following steps were taken to complete this project:

- a. The standards data for Outside Machinery that already existed at Ingalls was reviewed. Data found to be obsolete was targeted as areas to develop MOST standards.
- b. A list of jobs to be studied during the time schedule of the project was developed and the machining equipment specifications were procured.
- c. The Operation Formulae Standard data was developed.
- d. A standards manual format was submitted to the Sp-8 panel for approval.
- e. The shipboard machining and equipment installation standards were developed.
- f. The standards were validated.
- g. The standards manual and final report was prepared and presented to SNAME sp-8 panel for approval.

FINDINGS, RECOMMENDATIONS, AND RESULTS

Several areas were identified for improvement during the observation of machining and equipment installation activities aboard ship. These areas include: Excessive Travel for Tools, Equalization of Tool Distribution between Tool Rooms, and Equipment Capability Verification.

Excessive Travel For Tools

It was observed that some machinists were reporting to the job sites without all of the required tools to perform the job. Numerous trips were made off the ship for additional tools.

After analyzing the problem of excessive travel for tools, the project team suggested that tool lists (see figure 1) be developed for each job. These tool lists would list all of the necessary tools required to perform each job. The machinist could then easily gather all of the tools required before going aboard ship. This would help eliminate additional trips off the ship to obtain tools because of neglect, lack of planning, or inexperience on the part of the machinist. Studies reveal **that** elimination of excessive travel for tools could potentially save \$963,000 annually in labor costs.

BOAT HANDLING WINCH INSTALLATION MACHINIST TOOLS REQUIRED	
1.	6 in. Steel Scale (Rigid)
2.	Drill Bits (17/32 in. & 25/32 in.
3.	Hammer
4.	Center Punch .
5*	Portable Magnetic Base Drill
6.	Scriber
7.	File (for filing chocks)
8.	C-Clamp
9.	Ratchet (1/2 in. Drive)
10.	Socket (1-1/4 in.)
11.	Fixed End Wrench (1-1/4 in.)
12.	Reamers (Various sizes 3/4 into 1 in.)
13.	Feeler Gage .
14.	Level

Figure 1. Sample Tool List

The project team presented its finding and recommendation concerning excessive travel for tools to the Outside Machinery management (general superintendent and foreman). The response to this recommendation was excellent. The General Superintendent asked his foreman to have supervisors begin to develop tool lists for jobs. The supervisors would then distribute the tool lists to employees just before they went to work on those specific jobs. Initially the supervisors did develop tool lists for a few jobs. However, as time passed, the supervisor's enthusiasm for developing tool lists gradually decreased because of the multiplicity of responsibilities in other areas.

In an effort to revive the implementation of this recommendation, the Industrial Engineering department, with the cooperation of the Production

Planning department, researched and developed a means by which to print tool lists on the bill of material. This method would involve only a minimum amount of effort on the production planner's part. First, a production planner writes the bill of material as he normally does. Next, the planner would identify the descriptions of each major piece of equipment on the bill of material (examples: waste heat boiler, chill water pump, high pressure air dehydrator, air conditioning plant, etc.). Immediately after this step, the planner would match each major piece of equipment to a four-digit tool list code number. This code number would be obtained from a predeveloped matrix (see figure 2). Finally, the code number, hull, and bill of material numbers are typed into the computer by the planner. The planner would utilize the Technical Information Data Base (TIDB) Text system. The utilization of this system would produce tool lists that would be a part of the computer generated bill of material (see figure 3). Use of this system would allow the machinist to easily refer to the tool list. He could then gather tools as he is gathering the necessary materials.

Account No.	Item Description	Tool List Code No.
2501	Air Filter	5312
2501	Bellmouth	7003
2501	Centrifugal Fan	6115
2501	Cooling Coil	9387
2501	Precipitator	2115
2501	Unit Cooler	3879
2501	Unit Heater	2265
2501	Vaneaxial Fan	0000

Figure 2. Sample Account/Item-to-Tool List Code No. Matrix

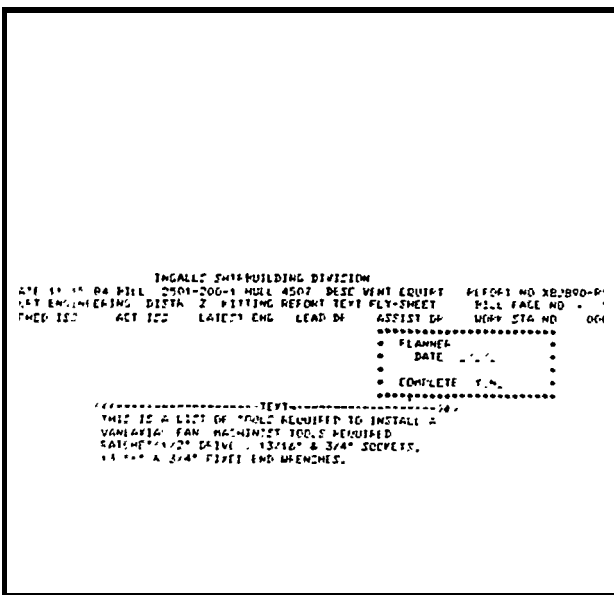


Figure 3. Printed Tool List
on Bill of Material Form

During this project, 14 tool lists were developed for various outside machinery machining and installation activities (see figure 4). In order to fully implement this program, a company must develop tool lists, then tool lists must be input into the text system and code matrices must be developed for each account. An IE coordinator would

be needed to perform these functions. This coordinator would also interact with both the planning department and the craft during the implementation period to ensure proper use and continued utilization of the program (see figure 5).

Five-Inch Gun Mount Facing
Main Engine Pad Face Milling -
Stern Tube Boring
Waste Heat Boiler Installation
Air Conditioning Plant Installation
Chill Water Pump Installation
H. P. Air Dehydrator Installation
Boat Handling Winch Installation
Vaneaxial Fan Installation
Sewage Pump Installation
Bridge Crane and Rails Installation
Convection Oven Installation
Hoist and Monorail Installation
Cooling Coil Installation

Figure 4. Tool Lists for Specific Jobs
Developed Under Task ES-8-21

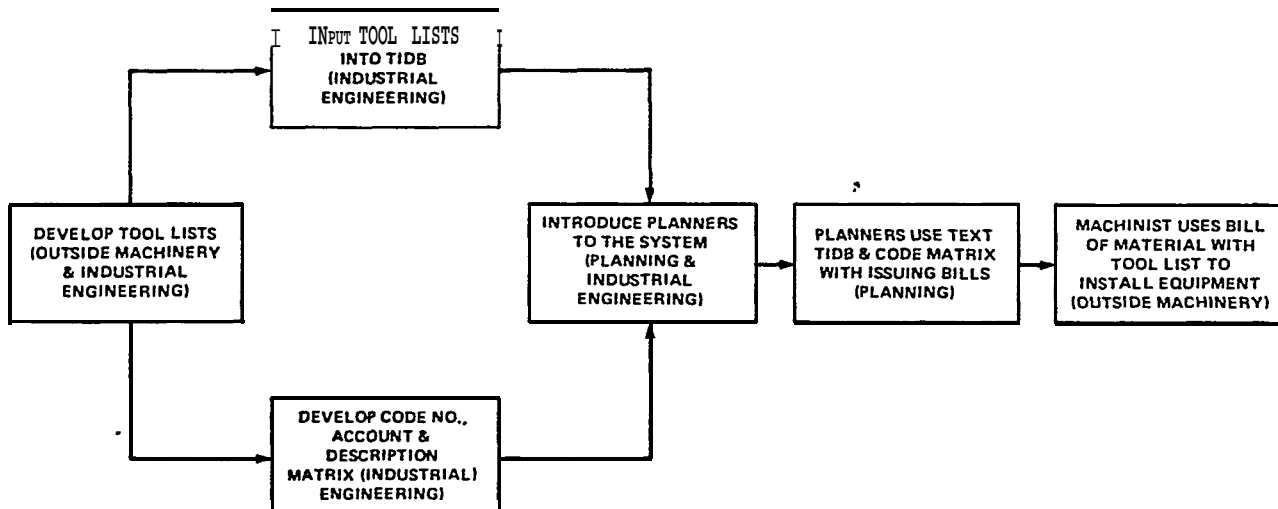


Figure 5. Tool List Program Network Diagram

Tool Rooms - Equalization of Tool Distribution

A problem identified early in the project was the subject of tool distribution between tool rooms. It was discovered that machinists in the bay areas of the shipyard had to travel to the wetdock tool room to obtain tools, although a tool room existed in the Bay 3 area (see figure 6).

There were several reasons that this condition existed. One reason was that the large variety and space requirements of Outside Machinery tools would not allow a full selection of tools to be stored in the smaller Bay 3 facility. Another reason was that the machinists in the bay area make up a small percentage of the total shipyard population in the bay area. The bay 3 tool room was purposely stocked to support hull and "pipe craftsmen who make up the majority of the workers in that area.

In response to this problem, the project team suggested to the Outside

Machinery management that some of the tools commonly used by outside machinists be transferred from the wetdock building tool room to the Bay 3 area tool room.

After a presentation of this recommendation to Outside Machinery management, the General Superintendent of Outside Machinery requested that the tool room perform a study to determine the high usage tools for Outside Machinists. After this study was performed some of these tools were transferred to the Bay 3 tool room in June 1984. At the time of this report an expansion of the Bay 3 tool room into the paint storage facility next door was planned. This will allow even more outside machinery tools to be stored in the Bay 3 tool room. Several delay studies were performed to determine the cost of this excessive travel. These studies reveal that elimination of this excessive travel would result in an annual labor savings of \$39,000.

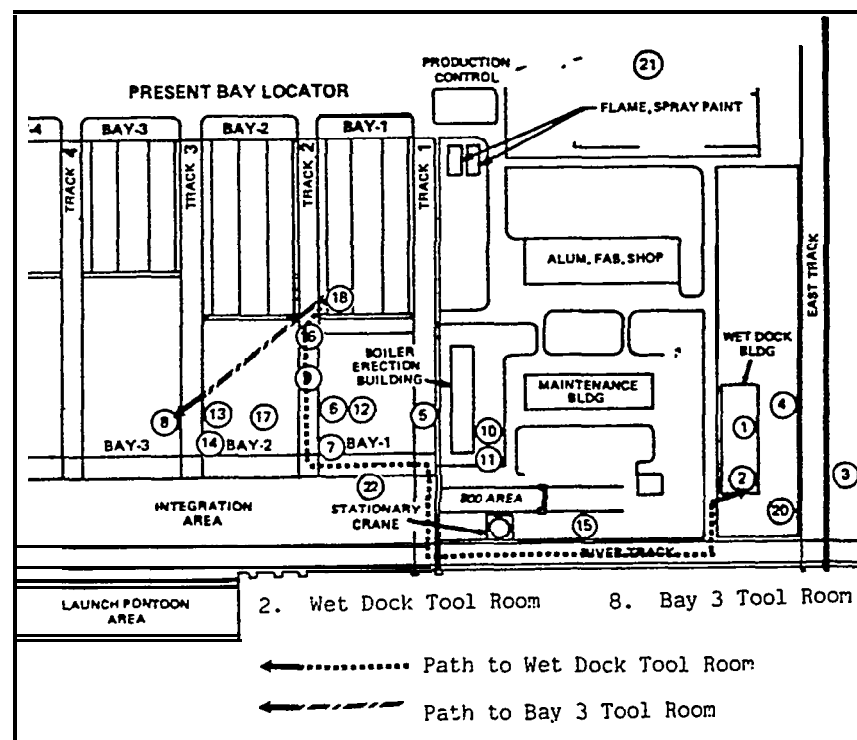


Figure 6. Wetdock Tool Room Versus Bay 3 Tool Room Travel Comparison

PROJECT ACTIVITIES

The performance of this project was divided into seven major activities. These activities were Existing Standards Data Review, Work Item Selection and Machining Equipment Specification Procurement, Operation Formulae Standards Development, Standards Manual Format Development, Application Standards Development, Standards Validation, and , Standards Manual Development.

Existing Standards Data Review

The first activity performed was a review of the existing MTM developed Outside Machinery Standards. These standards were developed from 1969 to 1971. They were based on the methods, tools, equipment, and facilities then available at Ingalls. A comparison was made to the current methods, tools , equipment, and facilities to determine if the standards were still applicable to current operations.

In reviewing the existing standards several problems were discovered. The majority of the standards were not applicable to the shipyard's current operations for the following reasons:

- 1 The items installed or manufactured in the existing standards have changed in configuration since the standards were developed.
- 1 Some of the standards included stop watch times where predetermined times can be developed.
- 1 Work formerly considered Outside Machinist work is now performed by other crafts.
- 1 The itms installed. or manufactured in the existing standards are being installed or manufactured by a different method.

In general, the majority of the Outside Machinery MTM-developed standards were not applicable to current shipyard conditions.

Work Item Selection and Machining Equipment Specifications Procurement

In order to develop a good operating plan for manning purposes, a list of items and operations to be studied during the time frame of the project had to be selected.

The next step taken was to obtain the outside machinery equipment specifications from Manufacturing Engineering. Speeds and feeds information for various materials was obtained to use in the development of process times.

Operation Formulae Standards Development

One of the objectives of this project was to produce a set of universal time standards for basic outside machinery functions. The operation formulae standards were developed to perform this function. These operations included Job Preparation, Area Travel (which applies to Ingalls only), Layout for Drilling, Drilling, and Boltup.

Standards Manual Format Development

A standards manual format was developed and submitted to the SNAME Sp-8 panel for approval. The manual format included 10 sections: Scope, Standards Manual Use, Standards Application, Operation Formulae, Layouts and Material Flow, Facilities and Equipment, Allowances, Standard Practices and Policies, Process Data, "and Data Synthesis and Backup Data.

Application Standards Development

Standards were developed for 14 shipboard outside machinery jobs. Three of these jobs involved shipboard machining: Five Inch Gun Mount Facing, Main Engine Pad Face Milling, and Stem Tube Boring. Eleven of these jobs were shipboard equipment installation: Waste Heat Boiler, Air Conditioning Plant, Chill Water Pump, High Pressure Air Dehydrator, Boat Handling Winch, Vaneaxial Fan, Sewage Pump, Bridge Crane and Rails, Convection Oven, Hoist and Monorail, and Cooling Coil.

Standards Validation

The standards developed in this project were validated by reviewing and verifying the methods, tools equipment, layouts, and standard time development.

Standards Manual Development

A manual containing the instructions on how to apply the standards developed during the period of this project. This manual contains all of the supporting information and was submitted to SNAME sp-8 panel.

PROJECT SPIN-OFF

a problem occurred in the application of the drilling process time charts (see figure 7). Initially, it was difficult to find an American Iron and Steel Institute (AISI) equivalent for the MIL-SPEC Number of various materials. Ingalls foundation drawings identified material by its MIL-SPEC Number.

However, the tables from which the drilling process time charts were

developed used AISI designations to identify materials (see figure 8). Being unable to compare the AISI equivalent number to the MIL-SPEC number would have rendered the project team incapable of using the drilling process time charts.

After a significant amount of research had taken place, a metallurgist, J. M. Earley, at the National Bureau of Standards was contacted. Working in

PROCESS TIME FOR DRILLING ONE INCH DEPTH HOLES IN TMU'S								
MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0001	303	158	190	190	190	211	285	304
0002	273	151	182	182	182	202	273	291
0003	390	202	242	242	242	269	364	422
0004	390	202	242	242	242	269	364	388
0005	390	202	242	242	242	269	364	422
0006	0	420	420	560	504	560	672	747
0007	0	682	910	910	1024	1213	1638	1986
0008	0	910	1213	1456	1560	1618	2185	2913
0009	341	173	208	208	208	231	312	333
0010	341	165	198	198	198	220	298	317
0011	455	242	364	416	437	485	582	647
0012	390	202	242	242	242	269	364	388
0013	420	227	273	303	341	420	455	496
0014	455	390	390	445	468	520	624	693
0015	0	546	546	728	655	728	874	971

Figure 7. Sample Drilling Process Time Chart

conjunction with the metallurgist, it was determined that if the following information could be found for the material being drilled the process time charts could be utilized.

The information derived from this method has not only helped in determining AISI equivalents for the purposes of this project but for other projects in the department.

- 1 The major class the material belongs to (Ex. Plain Carbon Steel)
- 1 The percent of carbon content
- 1 The Brinell hardness.

MATERIAL AND CONDITION CODE	MATERIAL	HARD NESS BHN	CONDITION	SPEED Fpm	FEED			INCHES PER MIN		REVOL PER MIN		DRILL BIT DIA.			AISI EQUIV. MATERIAL
					1/16	1/8	1/4	1/2	3/4	1	1 1/2	2			
0001	FREE MACHINING PLAIN CARBON STEELS	100 to 140	Hot Rolled or Annealed	70 to 115	.001 -	.004	.005	.010	.015	.018	.020	.025		A10 M7 M1	
0002	Desulfurized 81111 1115 81112 1212 81113 1213 1113 1213-10	140 to 200	Cold Drawn	100 to 120	.001 -	.004	.005	.010	.015	.018	.020	.025		M10 M7 M1	
0003	Desulfurized 1112 1120 1122 1125 1125 1144 1127 1211 1128	100 to 150	Hot Rolled or Annealed	70 to 90	.001 -	.003	.005	.010	.015	.018	.020	.023		M10 M7 M1	
0004		140 to 200	Cold Drawn	70 to 90	.001 -	.003	.005	.010	.015	.018	.020	.025		M10 M7 M1	
0005		175 to 225	Hot Rolled, Normalized, Annealed or Cold Drawn	70 to 90	.001 -	.003	.005	.010	.015	.018	.020	.023		M10 M7 M1	
0005	Desulfurized 1122 1141 1127 1145 1128 1148 1129 1151 1148	275 to 325	Quenched and Tempered	65 to 75	-	.002	.004	.006	.010	.012	.015	.018		M10 M7 M1	
0007		175 to 225	Quenched and Tempered	40 to 55	-	.002	.003	.006	.008	.009	.010	.011		T15 M13	
0005		175 to 225	Quenched and Tempered	30 to 45	-	.002	.003	.005	.007	.009	.010	.010		T15 M13	
0009		100 to 140	Hot Rolled, Normalized, Annealed or Cold Drawn	80 to 105	.001 -	.004	.005	.010	.015	.018	.020	.025		A10 M7 M1	
0010	Traced 10110 12119 11128 12114	140 to 200	Hot Rolled, Normalized, Annealed or Cold Drawn	80 to 110	.001 -	.004	.005	.010	.015	.018	.020	.025		A10 M7 M1	
0011		140 to 200	Hot Rolled, Normalized, Annealed or Cold Drawn	60 to 75	.001 -	.004	.005	.007	.010	.012	.015	.018		A10 M7 M1	

Figure 8. Sample Material/Condition Code Description Matrix

TASK ES-8-2 1
OUTSIDE MACHINERY
WORK MANAGEMENT MANUAL

THE NATIONAL SHIPBUILDING
RESEARCH PROGRAM

Task ES-8-21
Data Development Of Detail Standards
For Outside Machinery Operations

CONDUCTED AT

Industrial Engineering Department
Ingalls Shipbuilding Division
Of Litton Systems, Inc.
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INGALLS Shipbuilding	W M - M A N U A L	CODE
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This project was performed as part of the National Shipbuilding Research Program, under subcontract to Bath Iron Works Corporation. Funding was provided jointly by the Maritime Administration (MarAd) and the U. S. shipbuilding industry. Administration of this project was through the Society of Naval Architects and Marine Engineers (SNAME) SP-8 panel on Industrial Engineering. Performance of the project was by the Industrial Engineering department of Ingalls Shipbuilding.

It is note worthy that this was the first standards development project under the direction of the National Shipbuilding Research Program as funded by MarAd that involves shipboard activities.

The purpose of this manual is twofold. First, it is to provide a set of outside machinery time standards that are generally adaptable to any shipbuilder within the industry. Second, it is to provide some application examples of these standards. The operation formulae section of this manual fulfills the first provision. The standards application section fulfills the second provision. The remainder of the manual is support information to enhance the readers understanding of these two sections.

The time standards in this project were developed using the Maynard Operation Sequence Technique (MOST). MOST is a predetermine motion time system. More specifically, the Basic MOST System was used.

It is important to note that the standards developed in this manual are time-standards not application standards. A time standard by definition is the necessary time to perform a job at the 100 percent performance level including allowances for human fatigue, personal time, and unavoidable delays. An application standard is a time standard with the addition of avoidable delays and labor performance adjustments.

Utilization of this data must consider the location where the work will be performed (shipboard or shop); the type of work system the employees are functioning under (day work, measured day work or incentive) and the specific labor practices that apply at their location before determining an application standard.

The data collected for this manual was obtained from observation of work on Ticonderoga (CG 47) class cruisers under construction at Ingalls Shipbuilding.

INGALLS
Shipbuilding

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PAGE 2-1

T SECTION 2 STANDARDS MANUAL USE

This section was developed to give instructions on the use and design of this standards manual. Below is an index showing how this section is constructed.

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GENERAL INFORMATION

Any properly constructed Work Management Manual is designed such that, the various parts are interactive and work together to perform a specific function. This Work Management Manual is designed in this manner. The various sections of this manual are linked together to accomplish four basic functions (see page 2-3):

1. Explanation of purpose and operation of manual.
2. Provide Application examples.
3. Provide General Operation Standards.
4. Provide Support Data.

The interaction between the various manual sections (see page 2-4) allows the tracing of a unit of data throughout the system, all the way from the appropriate work place layout to the time standard.

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WORK MANAGEMENT MANUAL
ORGANIZATION

FUNCTION	MANUAL SECTIONS INVOLVED		
EXPLANATION	Section 1 Scope	Section 2 Standards Manual Use	
APPLICATION EXAMPLES	Section 3 Standards Application		
GENERAL OPERATION STANDARDS	Section 4 Operation Formulae		
SUPPORT DATA	Section 5 Layouts & Material Flow	Section 6 Facilities & Equipment	Section 7 Allowances
	Section 8 Standard Practices	Section 9 Process Data	Section 10 Data Synthesis & Back-Up

WM - MANUAL

SECTION 2 STANDARDS MANUAL USE

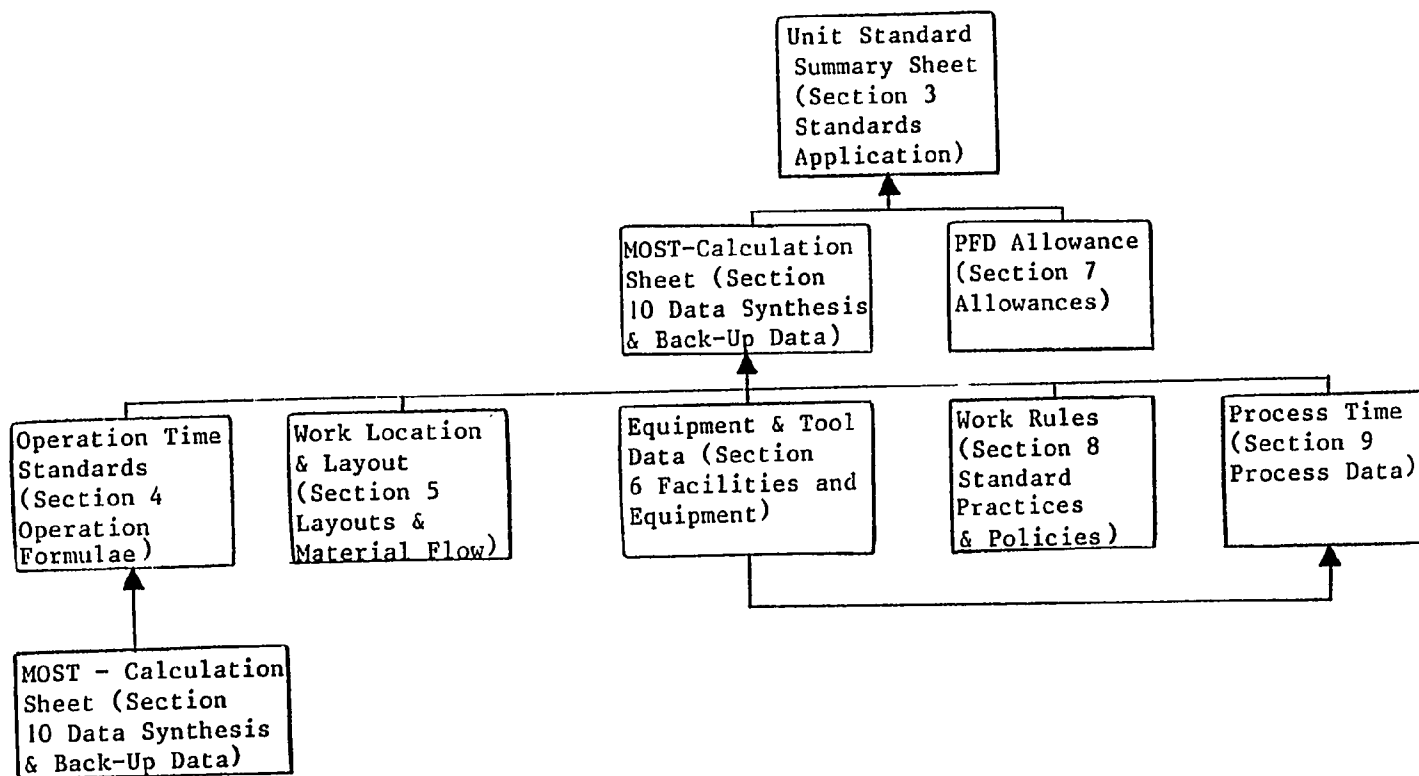
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PAGE 2-4

WORK MANAGEMENT MANUAL SECTIONAL INTERRELATIONSHIP



MOST Calculation and Back-Up Data

Coding System

Throughout the manual there are numbers (varying from 6 to 7 digits) called codes. These codes relate to the detail MOST calculation forms which provide the basis for the standards included in the manual. The Data Syntheses and Back-Up Section of the manual contains the MOST calculation forms in code number order (See page 10-1).

EXAMPLE:

2 0 0 3.0 5 1

The first digit denotes the type of work being performed:

- 1- OPERATIONAL
- 2- SHIPBOARD MACHINING
- 3- SHIPBOARD INSTALLATION

These digits denotes individual operations in the sequence in which the work is generally performed.

If a third digit behind the decimal point exists this is sub-operational data.

This digit identifies the individual study within the given type of work.

NOTE: Because of the volume of the data, the area travel detail back-up code information was not included in the data synthesis and back-up section of the manual.

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Page Numbering System

The pages in this manual are numbered using a two position numbering system.

EXAMPLE:

4 - 20

----	The first position denotes the section of the manual in which the page is located.	The second position denotes the sequential page number within the section.
------	------------------------------------------------------------------------------------	----------------------------------------------------------------------------

In the above example the page number 4-20 is the twentieth page in section 4, "Operation Formulae."

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STANDARDS APPLICATION USE

The purpose of Section 3, Standard Application, is to provide some application examples of the operational standards. The Standards Application Section also provides time standards for some common outside machinery machining operations and equipment installation examples.

The first part of Standards Application, pages 3-1 through 3-15, contains the unit standard summary sheets. The key information revealed on these sheets is:

- o The operations involved
- o The required manning
- o The operational and total standards for the job.

To learn more about the standard time development of the operations or elements refer to the appropriate code no. (see sample on page 2-8) in Section 10, Data Synthesis and Back-Up.

The second and third parts of Standard Application contain further detail. To learn more about the use of these standards refer to the Applicability Analysis for Machining Operations (p. 3-16) or Applicability Analysis for Equipment Installation (p. 3-17). To obtain a description of the equipment itself refer to the Machinery Units Descriptions (p. 3-18) or Installed Equipment Descriptions (p. 3-19 through 3-24).

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	SECTION 2 STANDARDS MANUAL USE	SIGN. TLC
		PAGE 2-9

OPERATION FORMULAE USE

One of the purposes of this manual was to provide a set of outside machinery standards that are generally applicable to any shipbuilder within the industry. The operation formulae section of the manual was prepared to this end.

Section 4, Operation Formulae, provides time standards for five basic outside machinery operations. These operations are Job Preparation, Area Travel, Layout for Drilling, Drilling, and Bolt-Up.

On the first page of Section 4 is an index of code numbers and page numbers for each operation formula. Each formula except Area Travel begins with a formula applicability sheet which explains the activities that are included in the time standard. The formulae continue with charts detailing the application of the time standards.

It is important to realize that the time standards in the operation formulae section does not contain any allowances for PF & D (personal time, fatigue and unavoidable delays).

All of the standards contained in the operation formula section, except Area Travel, are applicable to any location. Area Travel is applicable only to Ingalls Shipbuilding.

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SUPPORT DATA SECTIONS

The Layouts and Material Flow section of the manual (section 5) contains drawings of equipment locations aboard ship and process flow charts. See index on page 5-1.

The Facilities and Equipment section of the manual (section 6) contains tool lists for specific jobs, machining equipment specifications, and the list of required personal tools for a machinist.

The Allowances section of the manual (section 7) contains the development of the PF & D (Personal, Fatigue and Delay) factor used in this project.

The Standard Practices and Policies section of the manual (section 8) contains company operating procedures directl'y or indirectly affecting the worker.

The Process Data section of the manual (section 9) contains the derivation and application of the process times used in this manual. See the index on page 9-1.

The Data Synthesis and Back-Up section of the manual (section 10) contains the detailed MOST calculation sheets. See the index on page 10-1.

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		PAGE 3-1

This section of the manual contains the unit standard summaries and information pertaining to the applicability of these standards. Below is an index showing how this section is constructed.

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SIGN. FMW

PAGE 3-2

FIVE INCH GUN MOUNT FACING

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
2001.01	JOB Preparation	57,418	2.0	114,836
2001.02	Area Travel	52,124	2.0	104,248
2001.03	Set-Up Machine	2,840	2.0	5,680
2001.04	Final Position Machine	5,280	2.0	10,560
2001.05	Level Machine	13,370	2.0	26,740
2001.06	Remove Jack Tab	6,020	2.0	12,040
2001.07	Weld Machine in Place	19,540	2.0	39,080
2001.08	Operate Machine	388,397.	2.0	776,794
2001.09	Measure Progress & Verify Flatness	22,730	2.0	45,460
2001.10	Remove Machine	15,582	2.0	31,164
			SUBTOTAL	1,166,602
			PFD @ 20%	233,320
			TOTAL	1,399,922

TOTAL UNIT STANDARD

14.00 HRS.

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE 8/6/84
		SIGN. FWM
		PAGE 3-3
MAIN ENGINE PADS FACE MILLING		

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
2002.01	Job Preparation	58,598	2.0	117,196
2002.02	Area Travel	40,742	2.0	81,484
2002.03	Align Pads on Foundation	37,600	2.0	75,200,
2002.04	Weld pads in place	88,640	2.0	177,280
2002.05	Tack Weld Tabs	18,480	2.0	36,960
2002.06	Set-Up & Position Machine	73,810	2.0	147,620
2002.07	Level Machine & Set Taper	26,400	2.0	52,800
2002.08	Weld Machine in Place	112,080	2.0	224,160
2002.09	Install & Change Cutting Tools	18,290	2.0	36,580
2002.10	Daily Machine Care	6,840	2.0	13,680
2002.11	Operate Milling Machine	293,947	2.0	587,894
2002.12	Weld Support Frame in Place	123,720	2.0	247,440
2002.13	Check Taper & Flatness	41,600	2.0	83,200
2002.14	Remove Machine & Support Frame	184,480	2.0	<u>368,960</u>
SUBTOTAL				2,250,454
PFD @ 20%				<u>450,091</u>
TOTAL				2,700,545

<u>TOTAL UNIT STANDARD</u>	
<u>27.01 HRS.</u>	
I	I

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE 6/29/84
	STERN TUBE BORING	SIGN. TLC
		PAGE 3-4

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
2003.01	Job Preparation	44,361	2.2	97,594
2003.02	Area Travel	71,704	2.2	157,749
2003.03	Install Boring Equipment	397,512	2.0	795,024
2003.04	Operate Boring Bar	705,809	2.0	1,411,618
2003.05	Prepare Machine After Each Cut	537,734	2.0	1,075,468
2003.06	Remove Boring Equipment	74,992	2.0	149,984
			SUBTOTAL	-3,687,437
			PFD @ 20%	737,487
			TOTAL	4,424,924

TOTAL UNIT STANDARD
<u>44.25 HRS.</u>

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3001.01	Job Preparation	58,598	2.0	117,196
3001.02	Layout Pads	37,560	1.0	37,560
3001.03	Burn Pads	109,980	1.0	109,980
3001.04	Grind Pads	48,790	1.0	48,790
3001.05	Area Travel	82,404	2.0	164,808
3001.06	Layout Pad Locations	9,630	1.0	9,630
3001.07	Remove Temporary Bolts	14,606	1.0	14,606
3001.08	Tack Pads to Boiler	39,560	2.0	79,120
3001.09	Locate Boiler	25,080	2.0	50,160
3001.10	Tack Weld Pads to Deck	21,430	1.0	21,430
3001.11	Burn Pad to Boiler Weld	66,440	1.0	66,440
3001.12	Layout, Drill & SPotface Holes	117,270	2.0	234,540
3001.13	Bolt-Up With Temporary Bolts	68,766	2.0	137,532
3001.14	Bolt-Up With Permanent Bolts	136,576	3.0	<u>409,728</u>

SUBTOTAL 1 ,501,520

PFD @20% 300,304

TOTAL 1,801,824

TOTAL UNIT STANDARD

18.02 HRS.

INGALLS Shipbuilding	W M - M A N U A L ~	CODE	
		DATE	5/15/84
	AIR CONDITIONING PLANT INSTALLATION	SIGN.	FWM
		PAGE	3-6

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD REQUIRED IN TMU'S MANNING</u>		<u>TOTAL STANDARD IN TMU'S</u>
3002.01	Job Preparation	151,100	1.0	151,100
3002.02	Area Travel	64,364	1.0	64,364
3002.03	Layout & Drill Leg Stands	318,800	1.0	318,800
3002.04	Install Dummy Mounts & Leg Stands	105,496	1.0	105,496
3002.05	Check Snubber Alignment	101,664	1.0	101,664
3002.06	Install Permanent Leg Stand Bolts	121,818	1.0	121,818
3002.07	Install Resilient Mounts	61,052	1.0	61,052
3002.08	Install Snubber Cones & Liners	170,072	1.0	170,072
3002.09	Cut Out Shims	11,720	1.0	11,720
3002.10	Install Shims & Bolt Down Snubber Sockets	74,020	1.0	<u>74,020</u>
SUBTOTAL				1,180,106
PFD @ 20%				<u>236,021</u>
TOTAL				1,416,127

TOTAL UNIT STANDARD
<u>14.16 HRS.</u>

INGALLS Shipbuilding	WM - M A N U A L	CODE	
		DATE	4/27/84
	CHILL WATER PUMP INSTALLATION	SIGN.	TLC
		PAGE	3-7

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3003.01	Job Preparation	27,467	1.0	27,467
3003.02	Area Travel	15,060.	1.0	15,060
3003.03	Remove Temporary Mounts	15,666	1.0	15,666
3003.04	Install Permanent Mounts	6,650	1.0	6,650
3003.05	Install Self-Locking Fasteners	18,228	1.0	<u>18,228</u>
			SUBTOTAL	83,071
			PFD @ 20%	<u>16,614</u>
			TOTAL	99,685

	<u>TOTAL UNIT STANDARD</u>
	<u>1.00 HRS.</u>

INGALLS Shipbuilding	WM - MANUAL	CODE
		DATE 4/19/84
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION	SIGN. TLC
		PAGE 3-8

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARDS IN TMU'S</u>
3004.01	Job Preparation	58,301	2.0	116,602
3004.02	Area Travel	60,304	2.0	120,608
3004.03	Preparation for Burning Pads	5,860	1.0	5,860
3004.04	Burning Pads	10,660	1.0	10,660
3004.05	Grind Pads	25,860	1.0	25,860
3004.06	Drill Pads	16,130	1.0	16,130
3004.07	Layout for Drilling of Foundation	3,340	1.0	3,340
3004.08	Drill Foundation	19,080	1.0	19,080
3004.09	Tack Weld Pads	11,150	1.0	11,150
3004.10	Measure and Cut Shim Stock	6,100	1.0	6,100
3004.11	Burning-Wash-Out Tack Weld	8,680	1.0	8,680
3004.12	Install Shims & File Pads	9,070	1.0	9,070
3004.13	Install and Remove Temporary Fasteners	14,794	1.0	14,794
3004.14	Final Welding of Pads	13,370	1.0	13,370
3004.15	Install Self-Locking Fasteners	7,710	1.0	7,710
SUBTOTAL				389,014
PFD @ 20%				77,802
TOTAL				466,816

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE 6/26/84
	BOAT HANDLING WINCH INSTALLATION	SIGN. TLC
		PAGE 3-9

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3005.01	Job Preparation	42,001	2.0	84,002
3005.02	Area Travel	59,484	2.0	118,968
3005.03	Drill Pads	27,949	1.0	27,949
3005.04	Layout for Drilling Foundations	3,350	2.0	6,700
3005.05	Drill Foundation	29,329	1.0	29,329
3005.06	Install Temporary Bolts	16,578	1.0	16,578
3005.07	Weld Pads	37,555	1.0	37,555
3005.08	Install Fitted Bolts	55,996	1.0	55,995
3005.09	File Pads	246,052	1.0	245,052
3005.10	Remove Temporary Bolts	17,768	1.0	17,768
3005.11	Install Permanent Bolts	21,865	1.0	<u>21,865</u>
			SUBTOTAL	662,762
			PFD @ 20%	<u>132,552</u>
			TOTAL	795,314

TOTAL UNIT STANDARD
<u>7.95 HRS.</u>

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE 5/9/84
	VANEAXIAL FAN INSTALLATION	SIGN. TLC
		PAGE 3-10

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3006.01	Job Preparation	27,467	1.0	27,467
3006.02	Area Travel	12,570	1.0	12,570
3006.03	Remove Temporary Mounts	13,724	1.0	13,724
3006.04	Remove Covers and Brackets	23,418	1.0	23,418
3006.05	Install Covers and Brackets	22,828	1.0	22,828
3006.06	Install Resilient Mounts	10,240	1.0	10,240
3006.07	Belt Fan and Bracket Assembly to Resilient Mounts	6,954	1.0	6,954
			SUBTOTAL	117,201
			PFD @ 20%	23,440
			TOTAL	1,40,641

<u>TOTAL UNIT STANDARD</u>	
<u>1.41 HRS.</u>	I
I	I

INGALLS
Shipbuilding

W M - M A N U A L

CODE

DATE 6/14/84

SIGN. TLC

PAGE 3-11

SEWAGE PUMP INSTALLATION

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3007.01	Job Preparation	27,467	1.0	27,467
3007.02	Area Travel	14,160	1.0	74,160
3007.03	Remove Temporary Mounts	15,666	1.0	15,666
3007.04	Layout & Drill Holes In Foundation	36,704	1.0	36,704
3007.05	Install Permanent Mounts	6,650	1.0	.6,650
3007.06	Install Self-Locking Fasteners	18,228	1.0	<u>18,228</u>
			SUBTOTAL	118,875
			PFD @ 20%	<u>23,775</u>
			TOTAL	142,650

TOTAL UNIT STANDARD

1.43 HRS.

INGALLS Shipbuilding	WM - MANUAL	CODE
		DATE 8/24/84
	BRIDGE CRANE AND RAILS INSTALLATION	SIGN. FWM
		PAGE 3-12

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3008.01	Job Preparation	71,803	2.0	143,606
3008.02	Area Travel	37,000	2.0	74,000
3008.03	Layout Centerline	18,960	2.0	37,920
3008.04	Layout & Drill Beam	48,944	2.0	97,888
3008.05	Weld Guide Tabs in Place	10,930	2.0	21,860
3008.06	Position Rail, Layout & Measure	42,620	2.0	85,240
3008.07	Layout & Drill Rail	61,216	2.0	122,432
3008.08	Layout & Drill Pads	45,376	2.0	90,752
3008.09	Reposition Rail	87,894	2.0	175,788
3008.10	Position, Weld & Paint Pads	226,548	2.0	453,096
3008.11	Install Stops	84,700	2.0	169,400
3008.12	Install Bridge Crane	94,086	2.0	188,172
3008.13	Final Install Rail	65,280	2.0	<u>130,560</u>
SUBTOTAL				1,790,714
PFD @ 20%				<u>358,143</u>
TOTAL				2,148,857

TOTAL UNIT STANDARD
<u>21.49 HRS.</u>

	WM - MANUAL		CODE	
	CONVECTION OVEN INSTALLATION		DATE	8/27/84
			SIGN.	FWM
			PAGE	3-13

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3009.01	Job Preparation	42,884	2.0	85,768
3009.02	Area Travel	18,960	2.0	37,920
3009.03	Layout & Drill Pads	27,024	1.0	27,024
3009.04	Tap & Check Pads	22,722	1.0	22,722
3009.05	Bolt Up Pads	9,250	1.0	9,250
3009.06	Weld Pads in Place	45,820	1.0	<u>45,820</u>
			SUBTOTAL	228,504
			PFD @ 20%	<u>45,701</u>
			TOTAL	274,205

TOTAL UNIT STANDARD

2.74 HRS.

INGALLS Shipbuilding	W M - M A N U A L	CODE	
		DATE	8/24/84
	HOIST AND MONORAIL INSTALLATION	SIGN.	FWM
		PAGE	3-14

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3010.01	Job Preparation	69,743	2.0	139,486
3010.02	Area Travel	26,700	2.0	53,400
3010.03	Layout Centerline	7,650	2.0	15,320
3010.04	Layout & Drill Beam	19,952	2.0	39,904
3010.05	Bolt Pivot Blocks Temporary	35,268	2.0	70,536
3010.06	Weld Guide Tabs in Place	3,510	2.0	7,020
3010.07	Position Rail, Layout & Measure	11,280	2.0	22,560
3010.08	Layout & Drill Rail	22,512	2.0	45,024
3010.09	Layout & Drill Pads	17,536	2.0	35,072
3010.10	Bolt Pivot Blocks to Rail	34,540	2.0	69,080
3010.11	Reposition Rail	24,364	2.0	48,728
3010.12	Prepare & Weld Pads	39,210	2.0	78,420
3010.13	Install Hoist	35,932	2.0	71,864
3010.14	Final Install Rail	39,570	2.0	<u>79,140</u>
SUBTOTAL				775,554
PFD @ 20%				<u>155,110</u>
TOTAL				330,664

INGALLS Shipbuilding	WM - M A N U A L	CODE
		DATE 8/9/84
	COOLING COIL INSTALLATION	SIGN. FWM & TLC
		PAGE 3-15

UNIT STANDARD SUMMARY

<u>OPERATION CODE</u>	<u>OPERATION DESCRIPTION</u>	<u>OPERATION STANDARD IN TMU'S</u>	<u>REQUIRED MANNING</u>	<u>TOTAL STANDARD IN TMU'S</u>
3011.01	Job Preparation	71,223	1.0	71,223
3011.02	Area Travel	100,514	1.0	100,514
3011.03	Collect and Classify Legs	19,220	1.0	19,220
3011.04	Layout Holes	4,180	1.0	4,180
3011.05	Drill Holes	31,980	1.0	31,980
3011.06	Bolt-Up Legs	43,986	1.0	43,986
			SUBTOTAL	271,103
			PFD @ 20%	54,220
			TOTAL	325,323

<u>TOTAL UNIT STANDARD</u>		
I	<u>3.25 HRS.</u>	I

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE 10/12/84
	Section 3 Standards Application	SIGN. TLC
		PAGE 3-16

UNIT STANDARD APPLICABILITY ANALYSIS
FOR MACHINING OPERATIONS

The unit standard summaries for machining (pages 3-2 through 3-4) include time to perform all of the necessary activities to completely machine these items aboard ship.

The unit standard summaries of machining operations contained in this manual do not allow for gantry crane delays, painting, rigging or avoidable delays.

These standards are developed at the 100% performance level using the basic MOST predetermined motion time system. To attain these standards a workman must be adapted to the work and have gained sufficient experience to enable him to perform his job with little or no supervision. The worker must also possess coordinated mental and physical qualities which enable him to proceed from one element to another without hesitation delay. The workman must maintain a high level of efficiency by his knowledge and proper use of all tools and related equipment.

The explanation of the theory behind the 20% personal, fatigue and unavoidable delay allowance can be found on pages 7-1 and 7-2.

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE 10/12/84
	Section 3 Standards Application	SIGN. TLC
		PAGE 3-17

UNIT STANDARD APPLICABILITY ANALYSIS
FOR EQUIPMENT INSTALLATION

The unit standard summaries for equipment installation (pages 3-5 through 3-15) include the to perform all of the necessary activities to completely Install those itms aboard ship.

The unit standard summaries for equipment installation contained in this manual do no allow time for shop preparation work, connecting piping, ventilation ducting installation, foundation installation, rigging, painting, electrical hook-up or avoidable delays.

These standards are developed at the 100% performance level using the basic MOST predetermined motion time system. To attain these standards a worlanan must be adapted to the work and have gained sufficient experience to enable him to perform his job with little or no supervision. The worker must also possess coordinated mental and-physical qualities which enable him to proceed from one element to another without hestiation or delay. The workman must maintain a high level of efficiency by his knowledge and proper use of all tools and related equipment.

The explanation of the theory behind the 20% personal, fatigue and unavoidable delay allowance can be found on pages 7-1 and 7-2.

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE 10/12/84
	Section 3 Standard Application	SIGN. TLC
		PAGE 3-18

MACHINING UNITS DESCRIPTIONS

FIVE INCH GUN MOUNT

The five inch gun Mount is the structural support ring upon which the upper portion of a five inch gun rests. The dimensions of this unit can be found on page 9-47. For the shipboard location of this unit see the figures on page 5-4 and 5-5.

MAIN ENGINE PADS

The main engine pads are used with chocks to attain proper height and angular alignment between the ship's main engine and main shafting. The dimensions of these pads can be found on page 9-51. For the shipboard location of these pads see the figures on pages 5-4,5-6 and 5-7.

STERN TUBE

The stern tube is a water tight deck penetration that contains the main propellor shafting where it emerges from the ship. It consists of a hollow cast steel cylinder. The dimensions of the stern tube can be found on page 9-43. For the shipboard location of the stern tube see page 5-4and 5-11.

INGALLS Shipbuilding	W M - M A N U A L	QDE
		DATE 10/12/84
	Section 3 Standards Application	SIGN. TLC PAGE 3-19

INSTALLED EQUIPMENT DESCRIPTIONS

WASTE HEAT BOILER

The waste heat boiler removes excess heat generated by the ship's service generators and converts this heat for use by the hot water heating and distilling systems. For shipboard location of this unit see the figures on pages 5-4,5-6, and 5-7.

General Information

Dimensions: 180 LX73''WX84"H
Weight: 18,000 Lbs.
Installation Drawing: VLD 182017

AIR CONDITIONING PLANT

The air conditioning plant is the major component of the ships air conditioning system. It cools water it recieves. This water is then transferred through-out the ship to cooling coils. For the shipboard location of this unit see the figures on pages 5-4, 5-6, and 5-7.

General Information

Dimensions: 164" LX56''WX88" H
"Weight: 22,000 Lbs.
Installation Drawing: VLD 185078

INGALLS Shipbuilding	W M - M A N U A L	CODE
		DATE: 10/12/84
	Section 3 Standards Application	SIGN.
		PAGE 3-20

INSTALLED EQUIPMENT DESCRIPTIONS

CHILL WATER PUMP

The chill water pump transfers cooled water reviewed from the air conditioning plant to cooling coil units throughout the ship. For the shipboard location of this pump see the figures on pages 5-4, 5-6 and 5-7.

General Information

Dimensions: 53" L X 20" W X 33" H
Weight: 1,627 Lbs.
Installation Drawing: VLD 185079

HIGHPRESSURE AIR DEHYDRATOR

The high pressure air dehydrator is a unit that works in the ship's main high pressure system to remove moisture. For the shipboard location of this unit see the figures on pages 5-4, 5-6, and 5-7.

General Information

Dimension: 27" L X 24" W X 42" H
Weight: 650 Lbs.
Installation Drawing: VLD 185096

INSTALLED EQUIPMENT DESCRIPTIONS

BOAT HANDLING WINCH

The boat handling winch is a hoisting machine which is used primarily to lower or lift personnel carrier boats to or from the water. For the shipboard location of this unit see the figures on pages 5-4 and 5-10.

General Information

Dimensions: 44" LX 39" HX 56"W
Weight: 6,300 Lbs.
Installation Drawing: GD 186078

VANMXIAL FAN

The vaneaxial Fan is a unit used in the ventilation system to circulate air. For the shipboard location of this unit see the figures on pages 5-4 and 5-8.

General Information

Dimensions: 19" Dia. X24" L
Weight: 220 Lbs.
Installation Drawing: VLD 185139

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		PAGE 3-22

INSTALLED EQUIPMENT DESCRIPTION

SEWAGE PUMP

The sewage pump transfers sewage to a holding tank. For the shipboard location of this pump see the figures on pages 5-4 and 5-8.

General Information

Dimensions: 19" L X 28" W X 26" H
Weight: 652 Lbs .
Installation Drawing: VLD 185633

BRIDGE CRANE AND RAILS

The bridge crane, located in the helicopter hanger, transports loads in support of helicopter maintenance. For the shipboard location of this unit see the figures on pages 5-4, 5-12, and 5-13.

General Information

Dimensions: 2 ton hoist mounted on a beam, 8'7"LX5"WX8"H
spanning a pair of rails 32' LX 5" WX 8" H
Installation Drawing: GD 186058

INGALLS Shipbuilding	WM - MANUAL	CODE
		DATE 10/12/84
	Section 3 Standards Application	SIGN. TLC
		PAGE 3-23

INSTALLED EQUIPMENT DESCRIPTIONS

CONVECTION OVEN

The convection oven is used in the galley for the preparation of food. The convection oven operates differently than the conventional free heat flowing oven. The convection oven forces the heat to circulate by the use of a fan. For the shipboard location of this unit see the figures on pages 5-4, 5-12, and 5-13.

General Information

Dimensions: 44" L X 38" W X 40" H
Installation Drawing: GD 651004

HOIST AND MONORAIL

The hoist and monorail located in the helicopter hanger transports loads in support of helicopter maintenance. For the shipboard location of this unit see the figures on pages 5-4, 5-12, and 5-13.

General Information

Dimensions: 1 1/2 ton hoist mounted on a rail 28' LX5"WX8"H
Installation Drawing: GD 186058

INGALLS Shipbuilding	WM - MANUAL	CODE
		DATE 10/12/84
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		PAGE 3-24

INSTALLED EQUIPMENT DESCRIPTIONS

COOLING COIL

A cooling coil is a ventilation system unit which is supplied with chilled water from the air conditioning plant. When the chilled water passes through this coil it cools the air immediately surrounding the coil. This chilled air is then circulated by the use of a fan. For the shipboard location of this unit see the figures on pages 5-4 and 5-9.

General Information

Dimensions: 47" LX18"WX6"H
Weight: 125 Lbs.
Installation Drawing: VLD 185200

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SECTION 6 - FACILITIES AND EQUIPMENT

CODE

DATE 10/15/84

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PAGE 6-11

AIR CONDITIONING PLANT INSTALLATION MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel Scale (Rigid)
3. Hammer
4. Center Punch
5. Hole Punch
6. Ratchet (1/2 in. Drive)
7. Sockets (7/8 in. & 1-1/2 in.)
8. Slugging Wrenches (1-5/16 in. & 2-1/4 in.)
9. "Y" Wrench (Custom Snubber Cone Fitting)
10. Portable Magnetic Base Drill
11. Drill Bits (1/8 in., 25/32 in. & 29/32 in.)
12. Scriber
13. Shears (to cut shim stock)
14. Feeler Gage
15. Allen Wrench (1/2 in.)
16. 6 in. Dykes
17. Marking Chalk
18. Hydraulic Jack

INGALLS Shipbuilding	<h1 style="text-align: center;">WM - MANUAL</h1>	CODE	DATE
		SIGN.	
	OPERATION TITLE: JOB PREPARATION	SIGN. TLC	
		PAGE	4-2

JOB PREPARATION FORMULA APPLICABILITY

The values in this formula include time to receive instructions from supervisor, read bill of material , read and secure drawing, get and put away tools,. and secure tools and parts from tool crib and warehouse.

The values are for one person per shift. These values do not include any travel time or any PFD allowance.

To use the job preparation formula, standards have to be extracted from one of the three major categories.

- Initial Job Preparation Operations

Additional Job Preparation Operations

- Sub-Operation Activities

The initial job preparation chart gives time values for jobs of varying degrees of complexity (simple-average-complex). Initial job preparation is for the first day a job begins.

The additional job preparation chart also gives time values for jobs of varying degress of complexity. Additional job preparation is for the second and succeeding days of a job where less job preparation is generally required.

The sub-operation activities are operations which may be used to meet unique situations.

All detail data development of these operations may be found in section 10, Data Synthesis and Back-Up.

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TLC

OPERATION TITLE: JOB PREPARATION

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INITIAL JOB PREPARATION CODE 1001.10

CLASSIFICATION	TMU'S	APPLICATION	CODE
Simple	12050	Includes; receive instructions (3 Mins.) Read B.O.M./Simple Sketch/Get & Put away tools/Read and Sign time card.	1001.11
Average	42001	Includes; Simple Job Preparation, and additional time for receiving instruc- tions (5 mins.), additional time for securing tools from tool crib, and read- ing an average drawing.	1001.12
Complex	65559	Includes average Job Preparation and additional time for receiving instruc- tions (10 reins), secure parts from the warehouse and reading a complex drawing.	1001.13

NuE: The values for initial job preparation are for one (1) person per shift on the first day of the job. These values do not include any travel time **to** or from any location. For time values for travel see the area travel operation chart (code 1002.00). No PFD allowance has been added to these values.

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CODE

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OPERATION TITLE : JOB PREPARATION

ADDITIONAL JOB PREPARATION CODE 1001.20

CLASSIFICATION	TMU's	APPLICATION	
Simple	1180	Secure toos from too box and Put-up tools/read sign time card.	1001.21
Average	16597	Includes simple job preparation plus securing tools from tool crib.	1001.22
Complex	53152	Includes average job preparation plus securing additional materials from warehouse, also securing and reading an additional complex drawing.	1001.23

NOTE : The values for additional job preparation are for one (1) person per shift on second and succeeding days of job. These values do not include any travel to or from any location. For time **values** for travel see the area travel operation chart (code 1002.00). . No PFD allowance has been added to these values.

INGALLS Shipbuilding	WM - MANUAL	CODE	1001.00
		DATE	1/13/84
	OPERATION TITLE: JOB PREPARATION	SIGN.	~C
		PAGE	4-5

Below is a complete listing of Job Preparation Operations and Sub-Operations:

OPERATIONS:

<u>DESCRIPTION</u>	<u>CODE</u>	<u>TMUS</u>
Simple Initial Job Preparation	1001.11	12050
Average Initial Job Preparation	1001.12	42001
Complex Initial Job Preparation	1001.13	65559
Simple Additional Job Preparation	1001.21	1180
Average Additional Job Preparation	1001.22	16597
Complex Additional Job Preparation	1001.23	53152

SUB-OPERATIONS :

<u>DESCRIPTION</u>	<u>CODE</u>	<u>TMUS</u>
Get tools from tool box or put tools in tool box	1001.111	440
Secure tools from tool crib	1001.121	15417
Additional time for reading average drawing	1001.122	1.1200
Additional time for reading complex drawing	1001.131	3780
Secure parts from warehouse	1001.132	11445
Secure Material requisition form from Production Control	1001.1321	3042
Secure drawings from Reproduction Services	1001.231	6070

All detail data, development of these operations may be found in Section 10, Data Synthesis and Back-Up under the appropriate code no.

INGALLS Shipbuilding	WM - MANUAL	CODE
		1002.00
	OPERATION TITLE: AREA TRAVEL	DATE 1 / 18 / 21
		SIGN. TLC
		PAGE 4-6

AREA TRAVEL FORMULA DATA TABLE APPLICABILITY

The values in these formulas include the time to walk one way distances to frequently visited areas of the shipyard by outside machinists.

These values do not include any PFD allowances.

Values are for a single person.

To use the area travel formula data table, standards have to be extracted from the following categories:

- o From Tool Boxes - To Work Area
- o From Ship - To Support Area

Both the from tool boxes - to work area" and "from ship - to support area" charts show the starting location for the travel in the "from" column. The "to" column shows the location of the destination of the travel. This chart shows one way distance, the time value in TMU's, and the code number which relates to the travel route taken. The ship locations designated on these charts extend from the steps of the module on ground level to, or from, various areas of the shipyard. To arrive at specific areas on the ship, the additional time to get to those areas will have to be added into any complete item study.

INGALLS Shipbuilding	WM - MANUAL	CODE	1001.00
		DATE	1/13/84
	OPERATION TITLE: JOB PREPARATION	SIGN.	TLC
		PAGE	4-4

ADDITIONAL JOB PREPARATION CODE 1001.20

CLASSIFICATION	TMU's	APPLICATION	CODE
Simple	1180	Secure tools from tool box and Put-up tools/read sign time card.	1001.21
Average	16597	Includes simple job preparation plus securing tools from tool crib.	1001.22
Complex	53152	Includes average job preparation plus securing additional materials from warehouse, also securing and reading an additional complex drawing.	1001.23

NOTE: The values for additional job preparation are for one (1) person per shift on second and succeeding days of job. These values do not include any travel to or from any location. For time values for travel see the area travel operation chart (code 1002.00). No PFD allowance has been added to these values.

INGALLS Shipbuilding	WM - MANUAL	CODE	1002.10
		DATE	1/18/84
	OPERATION TITLE: AREA TRAVEL	SIGN.	TLC
		PAGE	4-8

FROM: TOOL BOXES

TO: WORK AREA

FROM	TO	DISTANCE ONE WAY	TMU's	CODE
7) Pre Integration Employee Tool Box	12) Module 1 Stairs	38 ft.	240	1002.11
7) Pre Integration Employee Tool Box	13) Module 2 Stairs	438 ft.	3300	1002.12
7) Pre Integration Employee Tool Box	14) Module 3 Stairs	375 ft.	2700	1002.13
7) Pre Integration Employee Tool Box	15) Module 4 Stairs (ladder)	875 ft.	6042	1002.14
7) Pre Float-Off Employee Tool Box	22) Stairs to Elev. on integrated ship	225 ft.	1520	1002.15
7) Pre Float-Off & Pre Integration Employee Tool Box	2) Tool Room Wetdock Bldg	1638 Ft.	11311	1002.16
7) Pre Float-Off & Pre Integration Employee Tool Box	16) Free Stock	263 ft.	1960	1002.17
7) Module 2 Stairs	17) AMR #1	*	2270	1002.18
7) Module 2 Stairs	18) Assy 102 Ladder	400 ft.	3000	1002.19

NOTES: Values are for one person. No. PFD allowance is included in these values.

*See Section 10 for details.

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I II

 OPERATION TITLE: AREA TRAVEL
 INGALLS SHIPBUILDING DIVISION

FROM: SHIP

TO: SUPPORT AREA

FROM	TO	DISTANCE ONE WAY	TMU ' S	CODE
12 Module 1 Stairs	8 Tool Rm Bay 3	525 ft.	3627	1002.201
12 "	9 Repro Track 2	188 ft.	1310	1002.202
12 "	5 Supv. Office Trk 1	388 ft.	2450	1002.203
12 "	2 Tool Room Wet Dock Bldg	1375 ft.	9494	1002.204
12 "	10 Production Control	638 ft.	4406	1002.205
12 "	21 Warehouse 301	2600 ft.	17952	1002.206
13 module 2 Stairs	8 Tool Room Bay 3	156 ft.	1130	1002.207
13 "	9 Repro Track 2	388 ft.	2700	1002.208
13 "	5 Supv. Office Track 1	875 ft.	6040	1002.209
13 "	2 Tool Room Wet Dock Bldg	1775 ft.	12256	1002.210
13 1.	10 Production Control	1050 ft.	7250	1002.211
13 "	21 Warehouse 301	2838 ft.	19595	1002.212

NOTES : Values for one person. No PFD allowance is included in these values.

INGALLS Shipbuilding	WM - MANUAL	CODE	1002.200
		DATE	1/18/84
	OPERATION TITLE: AREA TRAVEL	SIGN.	TLC
		PAGE	4-10

FROM: SHIP

TO: SUPPORT AREA
(continued)

FROM	TO	DISTANCE ONE WAY	TMU 's	CODE
14 Module 3	8 Tool Room Bay 3	75 ft.	540	1002.213
14 "	9 Repro Track 2	575 ft.	3970	1002.214
14 "	5 Supv. Office Trk 1	775 ft.	5353	1002.215
14 "	2 Tool Room Wet Dock Bldg	1688 ft.	11656	1002.216
14 "	10 Production Control Office	975 ft.	6732	1002.217
14 "	21 Warehouse 301	2938 ft.	20285	1002.218
15 Module 4	4 Repro wet Dock Area	938 ft.	6478	1002.220
15 "	5 Supv Office Trk 1	613 ft.	4234	1002.221
15 "	2 Tool Room Wet Dock Bldg	750 ft.	5175	1002.222
15 "	20 Prod. Control Office	400 ft.	3000	1002.223
15 "	21 301 Warehouse	2338 ft.	16144	1002.224

NOTES : Values are for one person. No PFD allowance is included in these values.

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CODE 1002.200
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OPERATION TITLE: AREA TRAVEL

FROM: SHIP

TO: SUPPORT AREA
(continued)

FROM	TO	DISTANCE ONE WAY	TMU'S	CODE
22 Integrated Ship	8 Tool Room Bay 3	675 ft.	4663	1002.225
2 2 "	9 Repro Track 2	500 ft.	3455	1002.226
2 2 "	5 Supv Office Track 1	375 ft.	2700	1002.227
2 2 "	2 Tool Room Wet Dock Bldg	1219 ft.	8418	1002.228
2 2 "	11 Production" Control Office	363 ft.	2700	1002.229
2 2 "	21 Warehouse 301	2475 ft.	17087	1002.230
3 Ship in Wet Dock Area	4 Repro Wet Dock Area	325 ft.	2450	1002.231
3 "	1 Supv Office Wet Dock Bldg	275 ft.	1960	1002.232
3 "	20 Prod. Control Office Wetdock Bldg.	338 ft.	2450	1002.233
3 "	2 Tool Room Wet Dock Bldg	400 ft.	3000	1002.234
3 "	21 Warehouse 301	1813 ft.	12517	1002.235

NOTES : Values are for one person. No PFD allowance is included in these values.

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CODE	1003.00
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SIGN.	TLC
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OPERATION TITLE : LAYOUT FOR DRILLING

LAYOUT FOR DRILLING FORMULA APPLICABILITY

The values in this formula include time to layout holes for drilling with or without a template. Manufacture template values include time to fabricate a template..

To use the layout for drilling formula table, standards have to be extracted based on the following type of layouts:

- . Without Template
- . With Template
- . Manufacture Template

The "without template" category includes measuring the necessary dimensions to locate a hole, center punching the hole and marking that hole for future reference.

The "with template" category includes using a manufactured template, placing the template in position, center punching the hole and marking that hole for future reference. The "with template" category also includes the use of an equipment's base as a template.

The "manufacture template" includes the time to manufacture a template using template paper.

NOTE : Values do not include travel or bending motions between hole locations.
No PFD allowance is included. Values are for 1 person.

INGALLS Shipbuilding	WM - MANUAL	CODE 1003.00
		DATE 1/30/84
	OPERATION TITLE : LAYOUT FOR DRILLING	SIGN. TLC
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LAYOUT FOR DRILLING FORMULA DATA TABLE

LAYOUT	STANDARD IN TMU'S	CODE
WITHOUT TEMPLATE	1390 (Per Hole)	1003.10
WITH TEMPLATE	323 (Per Hole)	1003.20
MANUFACTURE TEMPLATE	1236 (Per Hole)	1003.30

NOTE : No PFD allowance included. Values are for 1 person.

INGALLS Shipbuilding	WM - MANUAL	CODE	1004.00
		DATE	2/2/82
	OPERATION TITLE: DRILLING	SIGN.	TLC
		PAGE	4-14

DRILLING FORMULA APPLICABILITY

The values in this formula include time to set-up an electric hand drill or a magnetic base drill. The application of these standards is on a per hole, per job, or as required basis as noted.

DRILLING FORMULA DATA

OPERATION DESCRIPTION	SUB-OPERATIONS	TMU ' S	CODE
SET-UP WITH MAGNETIC BASE DRILL	Position Drill (per hole)	740	1004.11
	Use Safety Chain (per hole)	940	1004.12
	Plug in Extension Cord (per job)	2960"	1004.13
	Change Drill Bit (per job or as req'd)	2400	1004.14
	Hand Feed Drill Bit To and From Work Piece (per hole)	530	1004.15
SET-UP WITH ELECTRIC HAND DRILL	Plug in Extension Cord (per job)	2960	1004.13
	Change Drill Bit (per job or as req'd)	2400	1004.14
	Hand Feed Drill Bit to and From Work Piece (per hole)	110	1004.21
PROCESS TIME	Process time is determined by depth, material, brinell hardness, and diameter of the hole drilled	See Process Time charts for appropriate value	See page 9-24

NOTE : No PFD allowance included. Values are for one person.

BOLT-UP FORMULA APPLICABILITY

The values in this formula include time to install a bolt in a non-threaded hole and assemble up to two washers and one nut to hold machinery.

The operations covered in this formula can be performed in all areas of the shipyard, shops and shipboard.

The tools involved include the use of two fixed wrenches or a fixed wrench and ratchet.

To use the Bolt-Up Formula data table, standards have to be extracted from the category section. Three major categories exist:

- . Set-Up
- . Position Bolt
- . Turn Bolt

The set-up category differentiates between two fixed wrenches and a fixed wrench and ratchet. The standards are applied on a per job basis and includes removing the tools and materials from a tool bag at the work sight and putting materials and tools back in tool bag when the job is complete. The position bolt category includes placement of the bolt with washer in the hole and use of a hammer for tight holes. The standards are applied on a per bolt basis. This standard can be used for the removal of bolts. The turn bolt category differentiates between the use of a ratchet or fixed wrench and between plain nuts and bolts and elastic stop nuts and bolts. The charts mentioned under the standards column are identified by the Code Number which identifies its location in the data synthesis section.

A major portion of this analysis is based on the assembly of bolts. However, this is expanded to include the removal of bolts. Removing a bolt can be less or more than the assembly. In some cases, a bolt can be loosened and "run out" rather easily. In other cases the loosening can involve considerable time, or the "run out" can be difficult. Therefore, for all practical purposes, the assembly and removal of bolts is set-up as one classification.

INGALLS Shipbuilding	WM - MANUAL	CODE 1005.00
		DATE 2/15/84
	OPERATION TITLE: BOLT-UP	SIGN. TLC
		PAGE 4-17

BOLT-UP FORMULA DATA TABLE

OPERATION DESCRIPTION	CATEGORY		CODE	TMU's
INSTALL BOLT TO NON- THREADED HOLE AND ASSEMBLE NUT AND WASHER	SET-UP	FIXED WRENCH (Apply Per Job)	1005.01	860
		RATCHET (Apply Per Job)	1005.02	970
	POSITION BOLT (Apply Per Bolt)		1005.03	410
	TURN BOLT	RATCHET & FIXED WRENCH (APPLY Per Bolt)	1 005.04	See Page 6-18
			ELASTI- STOP NUTS & BOLTS 1005.05	See Page 6-19
		TWO FIXED WRENCHES (Apply Per Bolt)	PLAIN NUTS & BOLTS 1005.06	See Page 6-20
			ELASTI- STOP NUTS & BOLTS 1005.07	See Page 6-21

NOTE : NO PFD ALLOWANCE INCLUDED. Values are for 1 person.

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OPERATION TITLE: BOLT-UP

CODE

1005.04

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Turn Bolt with ratchet for plain nuts and bolts

BOLT DIAMETER IN INCHES	STD IN TMUs
1/8	160
1/4	320
1/2	559
5/8	708
3/4	838
7/8	987
1	1117
1 1/2	1676

NOTES : No PFD Allowance included. Values are for one person.

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CODE 1005.05

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OPERATION TITLE: BOLT-UP

Turn bolt with ratchet for elasti-stop nuts and bolts

BOLT DIAMETER IN INCHES	STD. IN TMU's
1/8	240
1/4	420
1/2	810
5/8	1026
3/4	1215
7/8	1431
1	1620
1 1/2	2430

NOTES : No PFD Allowance included. Values are for one person.

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1005.06

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OPERATION TITLE: BOLT-UP

Turn bolt with fixed wrench for plain nuts and bolts

BOLT DIAMETER IN INCHES	STD. IN TMU'S
1/8	740
1/4	540
1/2	953
5/8	1207
3/4	1429
7/8	1688
1	1906
1 1/2	2859

NOTES : No PFD Allowance included. Values are for one person.

Turn bolt with fixed wrench for elasti-stop nuts and bolts

up to two washers and one nut to hold

ed in this formula can be performed in
shipboard.

lude the use of two fixed wrenches or

rmula data table, standards have to be
ee major categories exist:

p

ion Bolt

Bolt

1	3240
1 / 2	4860

NOTES : No PFD Allowance included. Values are for one person.

INGALLS Shipbuilding	WM - MANUAL	CODE	DATE
			SIGN.
	SECTION 5 LAYOUTS AND MATERIAL FLOW	SIGN.	TLC/FWM
		PAGE	5-1

It Layouts and Material Flow" shows the overall sectional layout for each item as installed on board ship. Also, it details the typical process sequences to machine or to install pieces of equipment.

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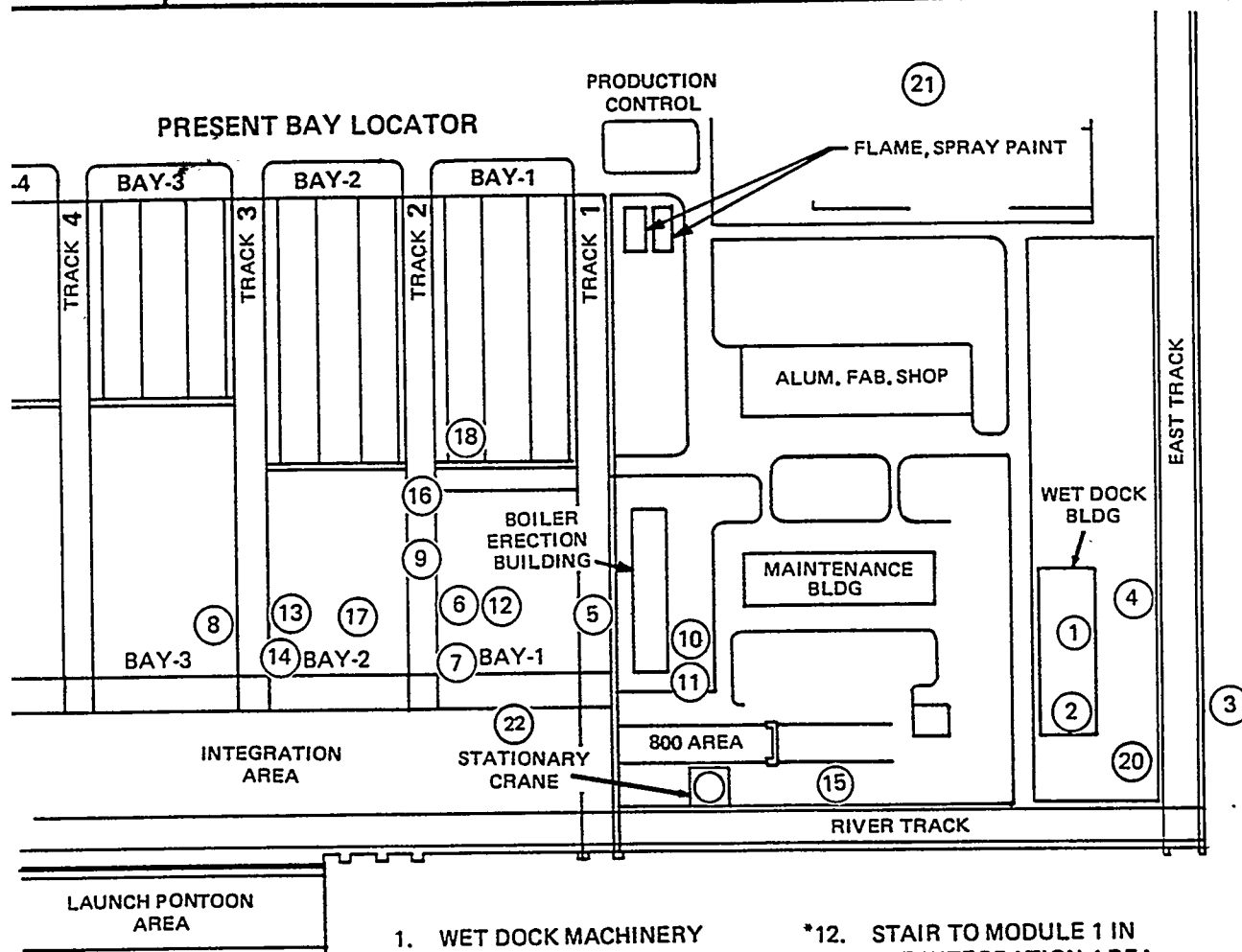
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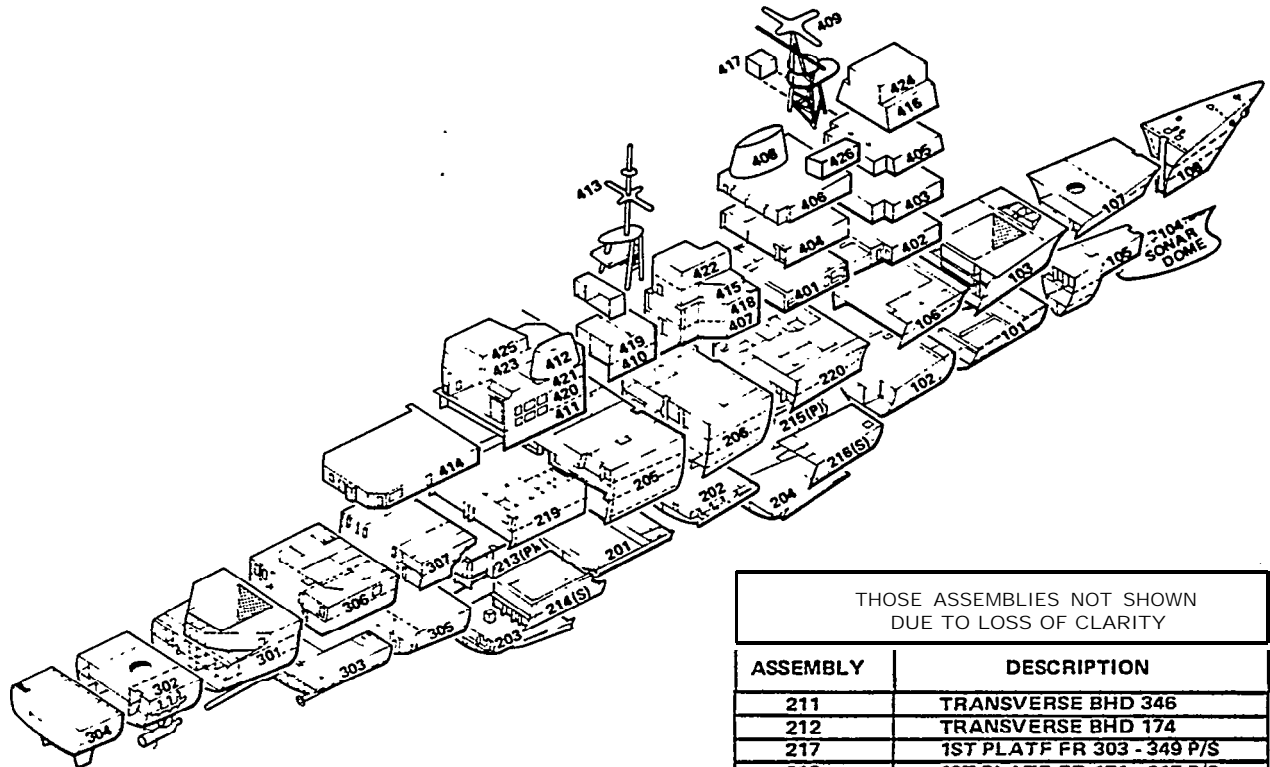
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1 (MAJOR WORKPLACE)

CG 47 CLASS SHIP EQUIPMENT LOCATOR



THOSE ASSEMBLIES NOT SHOWN
DUE TO LOSS OF CLARITY

ASSEMBLY	DESCRIPTION
211	TRANSVERSE BHD 346
212	TRANSVERSE BHD 174
217	1ST PLATF FR 303 - 349 P/S
218	1ST PLATF FR 171 - 217 P/S
221	BILGE KEEL FR 212 - 346 P/S
222	15'-0" FLAT FR 300 - 346
223	15'-0" FLAT FR 174 - 220

EQUIPMENT DESCRIPTION

CONVECTION OVEN
BRIDGE CRANE AND RAILS
HOIST AND MONORAIL
STERN TUBE
BOAT HANDLING WINCH
COOLING COIL
VANEAXIAL FAN
SEWAGE PUMP
FIVE INCH GUN MOUNT
WASTE HEAT BOILER
A. C. PLANT
CHILL WATER PUMP
H.P. AIR DEHYDRATOR
MAIN ENGINE PADS

EQUIPMENT LOCATION

ASSEMBLY 205, MAIN DECK
ASSEMBLY 421,03 LEVEL
ASSEMBLY 421,03 LEVEL
ASSEMBLY 303, STARBOARD - INTERBOTTOM
ASSEMBLY 419, PORT -02 LEVEL
ASSEMBLY 306, PORT - MAIN DECK
ASSEMBLY 102, 2ND PLATFORM
ASSEMBLY 102, 3RD PLATFORM
ASSEMBLY 107,01 LEVEL
ASSEMBLY 216, 1ST PLATFORM
ASSEMBLY 206, 2ND PLATFORM
ASSEMBLY 206, 2ND PLATFORM
ASSEMBLY 206, 2ND PLATFORM
ASSEMBLY 204, 3RD PLATFORM

SCALE: 1" = 12.5'

SUBJECT: FORWARD FIVE
INCH GUN MOUNT

TOP VIEW OF O1 LEVEL
FORWARD - WEATHER DECK

INTEGRATION
AREA

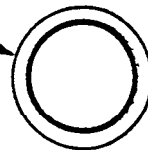
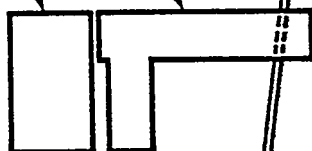
R 28

'R 54

FIVE-INCH
GUN MOUNT

PLATFORM

ELEVATOR

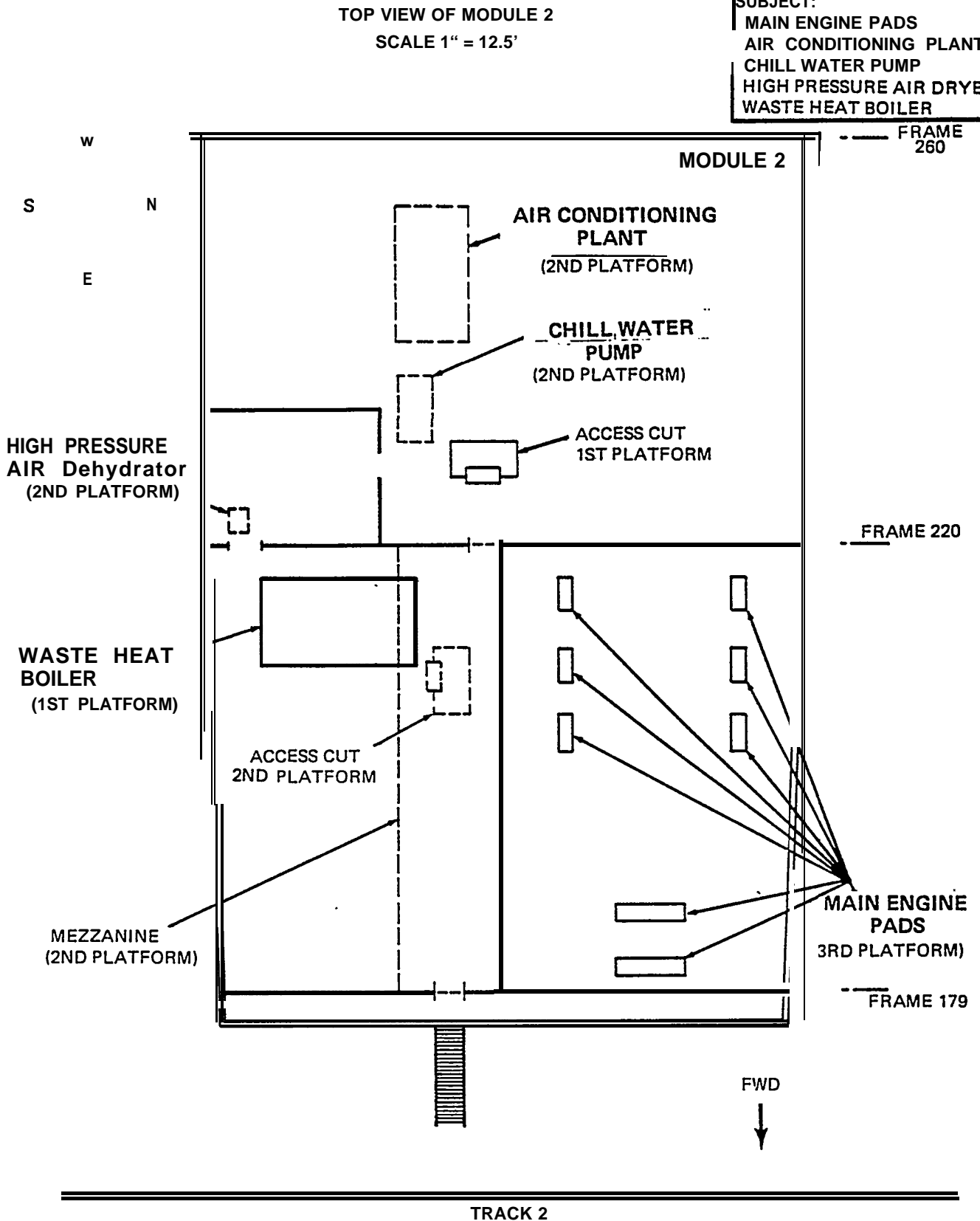


FR 94

LEGEND

SUBJECT:

MAIN ENGINE PADS
AIR CONDITIONING PLANT
CHILL WATER PUMP
HIGH PRESSURE AIR DRYER
WASTE HEAT BOILER



WM - MANUAL

COOE

9/25/8

SECTION 5 LAYOUTS AND MATERIAL FLOW

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PAGE 5-7

SIDE VIEW OF MODULE 2

SCALE: 1" = 12.5'

SUBJECT MAIN ENG. PAD:
H.P. AIR DRYER, CHILL
WATER PUMP, A.C. PLANT
WASTE HEAT BOILER

ACCESS
CUT

WASTE
HEAT
BOILER

CHILL WATER
PUMP

C. Inboard Area Layouts

MAIN DECK

1. Top View of 01 level - Forward Weather Deck

5-5

- a. Five Inch Gun

1ST PLATFORM

2. Top View of Module 2

5-6

- a. Waste Heat Boiler

2ND PLATFORM

- b. A. C. Plant

- c. Chill Water Pump

3RD PLATFORM

- d. H. P. Air Dehydrator

INTER BOTTOM

- e. Main Engine Pad

HIG
AIR

MODULE 2
FRAME 174, LOOKING AFT

INGALLS
INGALLS

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CODE _____

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PAGE 8-8

TOP VIEW OF ASSEMBLY 102

LEGEND

E

S

H.P. AIR DRYER, CHILL
WATER PUMP, A.C. PLANT.
WASTE SEWAGE PUMP

VANEAXIAL
FAN

2ND PLATFORM

SEWAGE
PUMP

3RD PLATFORM

ACCESS
CUT

2ND PLATFORM

WASTE
HEAT
BOILER

CHILL WATER
PUMP

LADDER

ACCESS CUT

MAIN ENGINE
PADS

LADDER
2ND PLATFORM
TO GROUND

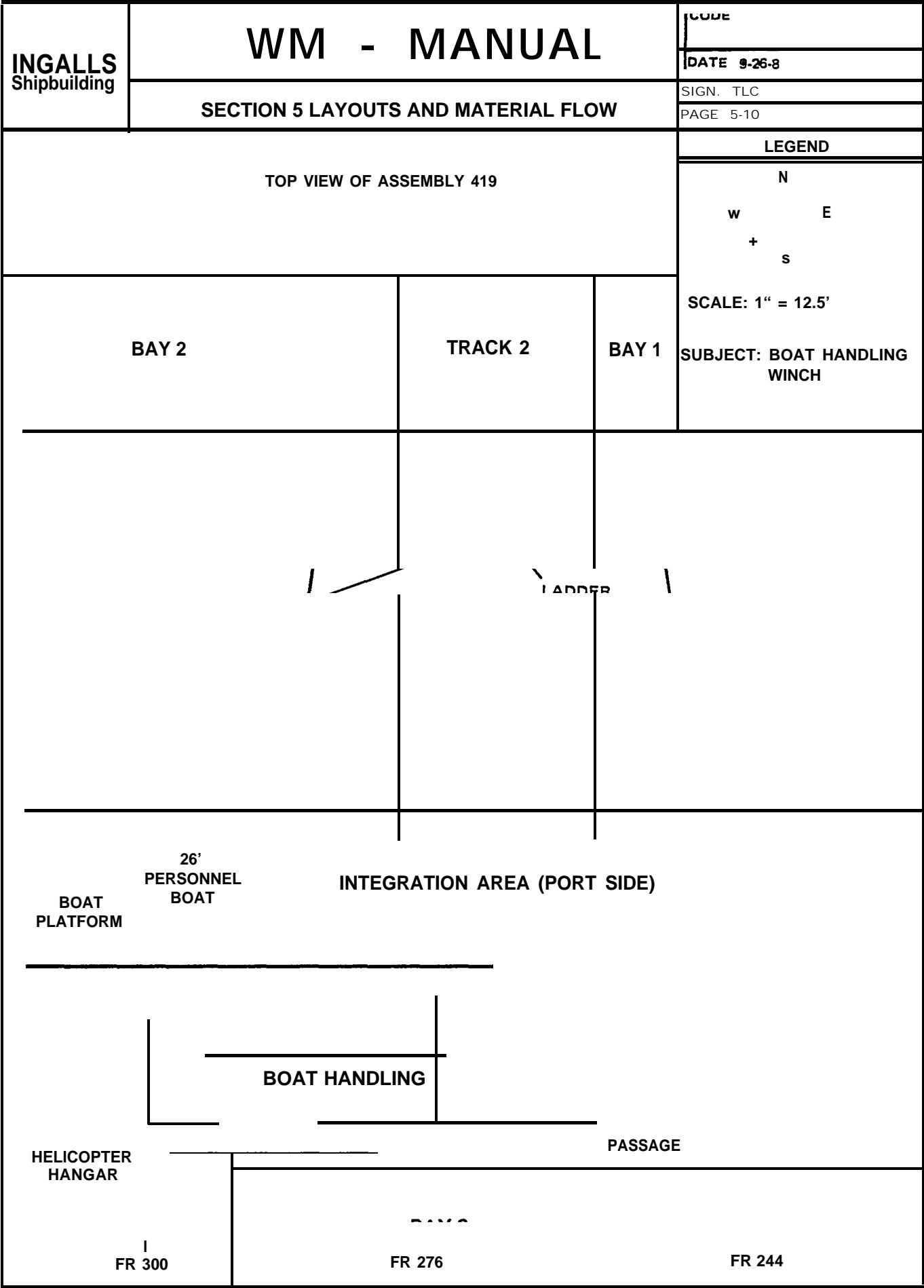
FR 146

FR 162

TRACK 2

BAY 2

INGALLS Shipbuilding	WM - MANUAL	CODE
	SECTION 5 LAYOUTS AND MATERIAL FLOW	DATE 9-26-64
		IGN. TLC
		AGE 5-9
TOP VIEW OF ASSEMBLY 306		LEGEND
BAY 1		E N - S ↓ W
		SCALE: 1" = 12.5' SUBJECT: COOLING COIL
TRACK 2		
<div><div>ASSEMBLY 306</div><div>FR 420</div><div>FR 390</div><div>LADDER</div><div>TORPEDO ROOM NO. 2</div><div>COOLING COIL ON LOCATION</div><div>PALLET WITH COOLING COIL LEGS</div></div>		
BAY 2		



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	SECTION 5 LAYOUTS AND MATERIAL FLOW	SIGN. TLC
		PAGE 5-11

UNDERSIDE VIEW OF ASSEMBLY 303

LEGEND

W ← | → E

SCALE 1" = 12.5'

SUBJECT: STERN TUBE

EAST - WEST GANTRY TRACK

LADDER
15 STEPS

INTEGRATION AREA (PORT SIDE)
(STERN)

SCAFFOLDING

LADDER
7 STEPS

BENCH

PASSAGE

FAN ROOM

(ST 13 D SIDE)

STERN TUBE

FR 452

FR 434

414

406

398

390

374

FORM R - 1457

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SIGN. TLC

'AGE 5-12

TOP VIEW OF GALLEY AND HELICOPTER HANGAR AREAS

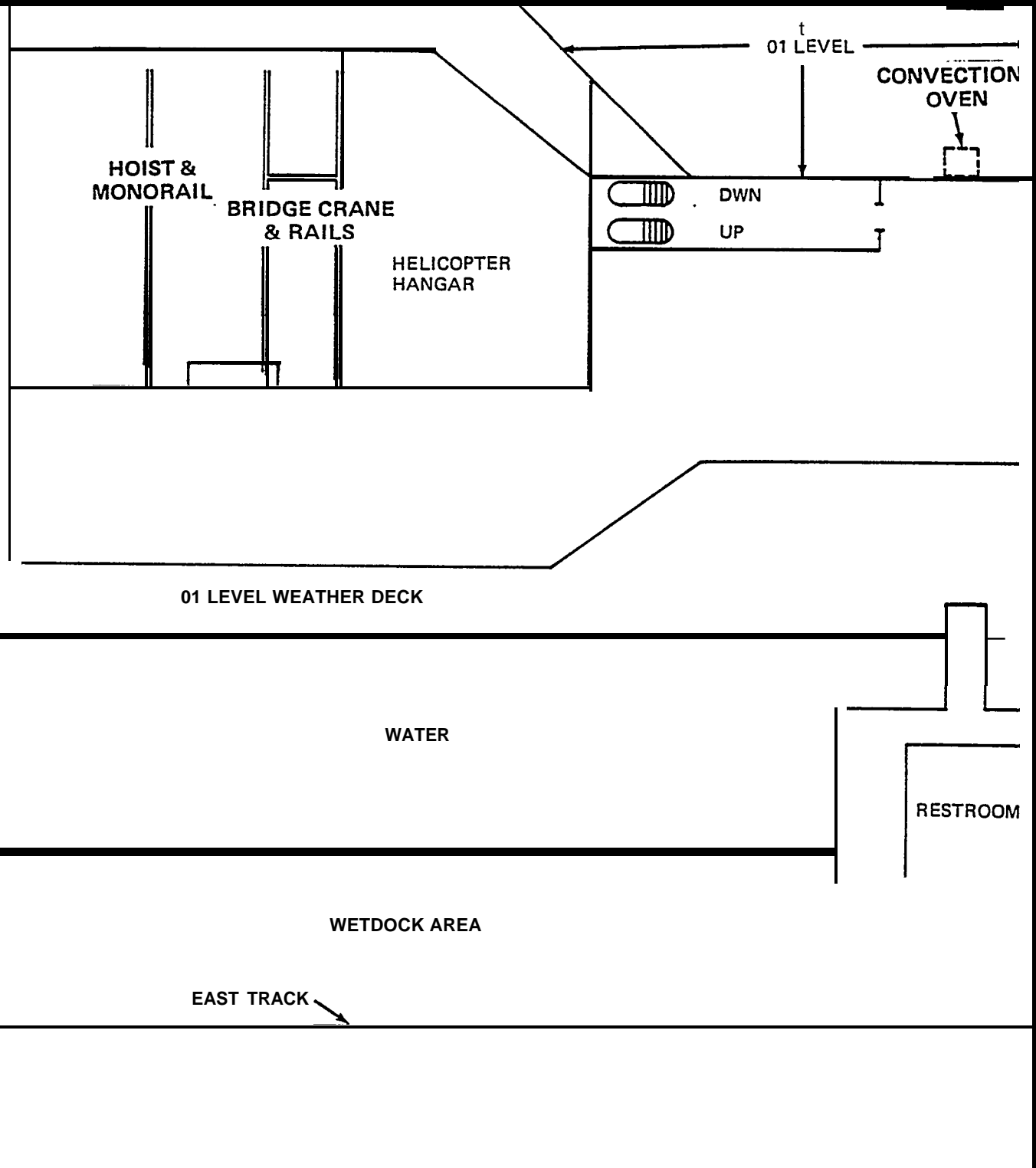
EAST PASCAGOULA RIVER

LEGEND N ~ S

SCALE: 1" = 12.5'

SUBJECT:

BRIDGE CRANE & RAILS,
HOIST & MONORAIL,
CONVECTION OVEN



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SIDE VIEW OF GALLEY AND HELICOPTER HANGER AREAS

LEGEND

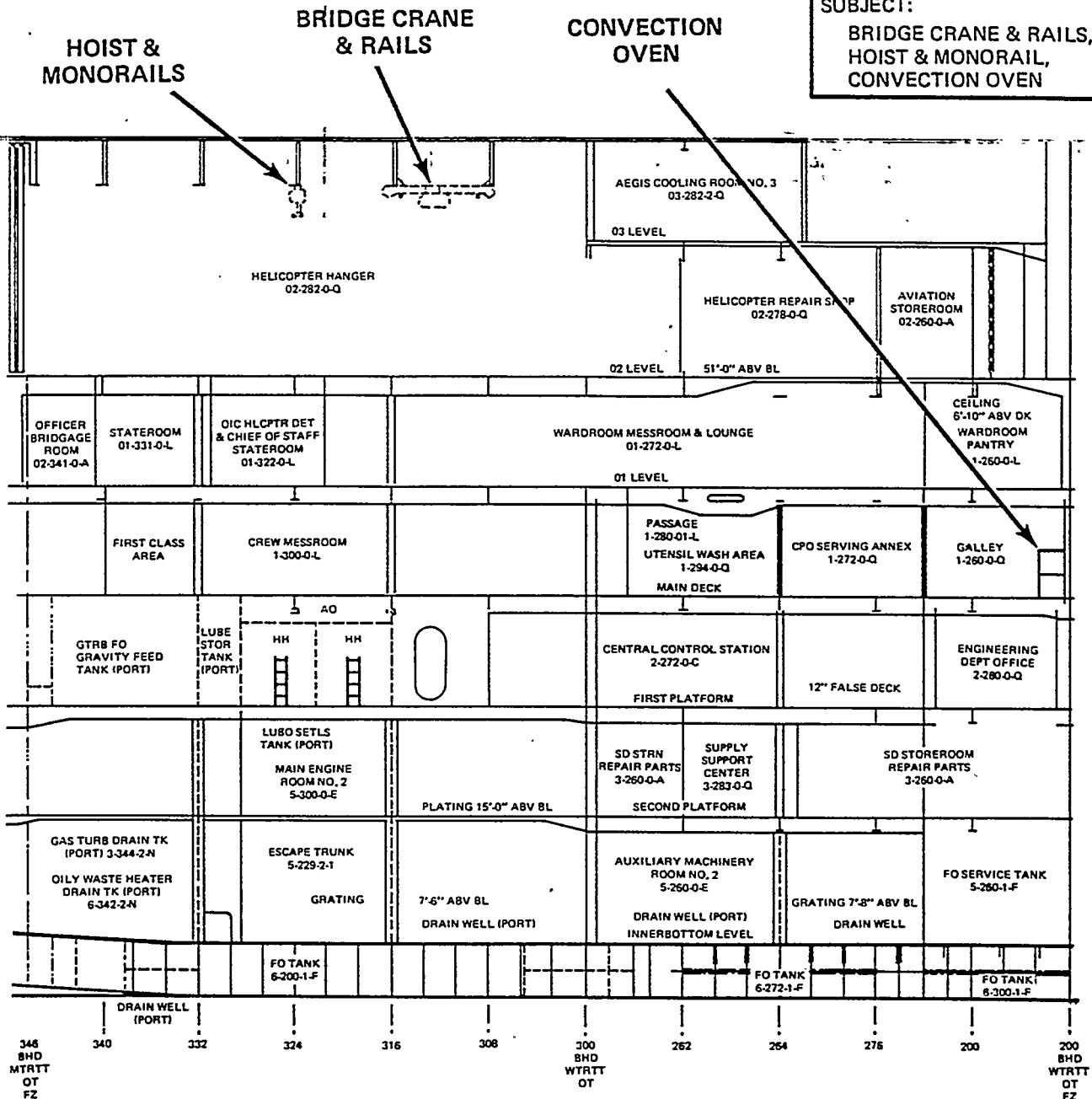
N ← → S

AFT ← → FWD

SCALE: 1" = 12.5'

SUBJECT:

BRIDGE CRANE & RAILS,
HOIST & MONORAIL,
CONVECTION OVEN



AT SHIP'S CENTER LINE, LOOKING PORT

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UNDERSIDE VIEW OF ASSEMBLY 303

III

LEGEND

W ← → E

SCALE 1" = 12.5'

SUBJECT: STERN TUBE

ACTIVITY

I

EAST - WEST GANTRY TRACK

DELAY
STORAGE

INTEGRATION AREA (PORT SIDE)

(STERN)

LADDER
15 STEPS

SCAFFOLDING

LADDER
7 STEPS

BENCH

(STBD SIDE)

STERN TUBE

ED 452

ED 424

414

406

300

300

274

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PROCESS FLOW CHART

ACTIVITY	<u>EQUIPMENT INSTALLATION</u>	OPERATION	
	<u>(TYPICAL)</u>	INSPECTION	
CHART BEGINS	<u>IN WAREHOUSE</u>	TRANSPORT	
CHART ENDS	<u>ON SHIP</u>	DELAY	
		STORAGE	

DESCRIPTION	SYMBOL				
1 Stored in Warehouse					
2 Transport to Machinery Assembly Shop (Truck)					
3 Inspect					
4 Prepare for Installation (As Necessary)					
5 Transport to Material Holding Area (Truck)					
6 Wait for Crane					
7 Transport on Board (Crane)					
8 Wait for Machinist and Rigger					
9 Position Unit (Chain fall)					
10 Temporary Bolt					
11 Take Sizes Liners/Chocks					
12 Unbolt					
13 Remove Unit (ChainFall)					
14 Place Liners/Chocks					
15 Reposition Unit (Chainfall)					
16 Temporary Bolt					
17 Wait for Welder					
18 Weld					
19 Unbolt					
20 Wait for Painter					
21 Paint					
22 Permanent Bolt-Up					
23 Inspect Installation					

LESS

TITLE	PAGE
I PORTABLE MACHINE SPECIFICATIONS	
A) Milling Machine	6-2
B) Boring Machine	6-3
C) Magnetic Base Drill Press	6-4
II. TOOLS	
A) Outside Machinist Personal Tool List	6-5
B) Tool Lists	6-6

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PORTABLE MILLING MACHINE BY MASTER MANUFACTURING COMPANY MODEL RPTM-6

SPECIFICATIONS :

Machining Head Power - 5 H.P.

Vertical Feed - 10 inches of travel

Transverse Feed - 14 inches of travel @ 1-11/16 to 16-3/8 IPM

Longitudinal Feed - 122 inches of travel @ 4-40 IPM

Weight - 4380 lbs.

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PORTABLE BORING MACHINE BY MULTIPLE BORING MACHINE COMPANY

SPECIFICATIONS :

BAR DIAMETER	- 4 inches
BAR LENGTH	- 8 feet
SPEED	-o to 10 PRM
FEED RATE	- 0.1 to 0.2 inches per minute
WEIGHT (Boring Bar Only)	- 1150 lbs.

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PORTABLE MAGNETIC DRILL PRESS BY BLACK AND DECKER MODEL 741

SPECIFICATIONS :

DRILLING CAPACITY	- Up to 1-1/4 inch diameter
REAMING CAPACITY	- Up to 1 inch diameter
TAPPING CAPACITY	- Up to 1 inch diameter
NO LOAD SPEED	- 250 & 500 RPM
RATED LOAD SPEED	- 175 & 315 RPM
DRILL LENGTH STROKES	- 15 inches
WEIGHT	- 101 lbs.
HEIGHT	- 31 inches
LENGTH	- 18-7/8 inches
WIDTH	- 4-13/16 inches

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OUTSIDE MACHINIST PERSONAL TOOL LIST

First Year - Tools required by 2nd pay period upon reporting to work:

- Tool Box
- Ball Pein Hammer - 12 oz.
- 8' - Steel Tape
- 10" Channel Lock Pliers
- 12" crescent Wrench
- Screw Drivers - Assorted Sizes (straight & phillips)
- 6" Steel Scale (rigid)
- Center Punch
- Scriber (with magnet)

Second Year - Tools required at start of 2000 work hours.

- 6" dykes
- 6" Crescent Wrench
- 1/2" Drive 12 point Socket set - 7/16" to 1-1/4"
- Hacksaw Frame
- 10" Vise Grips
- Alleri Wrench set - 1/16" to 3/8"
- Feeler Gauges - .001 to .032

Third Year Tools required at start of 4000 work hours.

- Wrench set Open End & Box End 3/8" to 1-1/4"
- 6" Needle Nose Pliers
- 4" & 8" Inside Calipers
- 4" & 6" Outside Calipers
- 3/8" Drive set (optional)
- 6" & 12" Dividers
- Machinist Combination Square
- Torpedo Level

It is understood that the apprentice may periodically purchase tools not listed above in order to perform his duty.

A First Class Machinist should have all of the above tools upon entry into the shipyard.

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TOOL LISTS FOR SPECIFIC JOBS

	<u>JOB DESCRIPTION</u>	<u>PAGE</u>
2001.00	Five Inch Gun Mount Facing	6-7
2002.00	Nain Engine Pad Face Milling	5-8
2003.00	Stern Tube Boring	6-9
3001.00	Waste Heat Boiler Installation	6-10
3002.00	Air Conditioning Plant Installation	6-11
3003.00	Chill Water Pump Installation	6-12
3004.00	High Pressure Air Dehydrator Installation	6-13
3005.00	Boat Handling Winch Installation	6-14
3006.00	Vaneaxial Fan Installation	5-15
3007.00	Sewage Pump Installation	6-16
3008.00	Bridge Crane and Rails Installation	6-17
3009.00	Convection Oven Installation	5-18
3010.00	Hoist and Monorail Installation	5-19
3011.00	Cooling Coil Installation	5-20

FIVE INCH GUN MOUNT FACING

MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel **Scale** (Rigid)
3. Hammer
4. Center Punch
5. Ratchet (1/2 in. Drive)
6. Socket (1 in.)
7. Slugging Wrench (1-1/2 in.)
8. Allen Wrench (1/4 in.)
9. Feeler Gage
10. Carbide Cutting Tool

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SECTION 6 - FACILITIES AND EQUIPMENT

MAIN ENGINE PADS FACE MILLING MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel Scale
3. Hammer
4. Center Punch
5. Ratchet (1/2 in. Drive)
6. Socket (3/4 in.)
7. Allen Wrench (1/4 in.)
8. Chalkline
9. Taper level
10. Carbide Single Point Cutting Tools
11. 10 ft. Straight Edge
12. Hydraulic Jack

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STERN TUBE BORING

MACHINIST TOOLS REQUIRED

1. Ratchet (1/2 in. Drive)
2. Socket Set (7/16 in. to 1-1/4 in.)
3. Fixed End Wrench Set (3/8 in. to 1-1/4 in.)
4. Hammer
5. File
6. Allen Wrench Set (1/16 in. to 3/8 in.)
7. 6 in. Steel Scale (Rigid)
8. Screw Driver (Flat)
9. ID Micrometer
10. Portable Surface Grinder
11. Chip Puller Rake
12. Feeler Gage
13. Carbide Cutting Tools

WASTE HEAT BOILER INSTALATION

MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. Hammer
3. Center Punch
4. Scriber
5. Drill Bit (1-5/16 in.)
6. Drill Bit (25/32 in.)
7. Drill Bit (17/64 in.)
8. Portable Magnetic Base Drill
9. Fly Cutter Tool
10. Feeler Gage
11. Fixed End Wrenches (1-7/8 in.)
12. Hydraulic Jack

AIR CONDITIONING PLANT INSTALLATION

MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel Scale (Rigid)
3. Hammer
4. Center Punch
5. Hole Punch
6. Ratchet (1/2 in. Drive)
7. Sockets (7/8 in. & 1-1/2 in.)
8. Slugging Wrenches (1-5/16 in. & 2-1/4 in.)
9. "Y" Wrench (Custom Snubber Cone Fitting)
10. Portable Magnetic Base Drill
11. Drill Bits (1/8 in., 25/32 in. & 29/32 in.)
12. Scriber
13. Shears (to cut shim stock)
14. Feeler Gage
15. Allen Wrench (1/2 in.)
16. 6 in. Dykes
17. Marking Chalk
18. Hydraulic Jack

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SECTION 6 - FACILITIES AND EQUIPMENT

CHILL WATER PUMP INSTALLATION

MACHINIST TOOLS REQUIRED

1. Socket (1-1/8 in. & 13/16 in.)
2. Ratchet (1/2 in. Drive)
3. Fixed End Wrenches (1-1/8 in. & 13/16 in.)

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HIGH PRESSURE AIR DEHYDRATOR INSTALLATION

MACHINIST TOOL REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel Scale (Rigid)
3. Hammer
4. Center Punch
5. Ratchet (1/2 in. Drive)
6. Socket (1-1/8 in.)
7. Fixed End Wrench (1-1/8 in.)
8. Portable Magnetic Base Drill
9. Feeler Gage
10. Scriber
- II. Drill Bits (1/8 in. & 25/32 in.)
12. File (for filing chocks)

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BOAT HANDLING WINCH INSTALLATION

MACHINIST TOOLS REQUIRED

1. 6 in. Steel Scale (Rigid)
2. Drill Bits (17/32 in. & 25/32 in.)
3. Hammer
4. Center Punch
5. Portable Magnetic Base Drill
6. Scriber
7. File (for filing chocks)
8. c-clamp
9. Ratchet (1/2 in. Drive)
10. Socket (1-1/4 in.)
11. Fixed End Wrench (1-1/4 in.)
12. Reamers (Various sizes 3/4 in. to 1 in.)
13. Feeler Gage
14. Level

	WM - MANILA	CODE	100 .00	
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VANEAXIAL FAN INSTALLATION
MACHINIST TOOLS REQUIRED

3
3C
3J
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3V
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t

1. Ratchet (1/2 in. Drive)
2. Sockets (13/16 in. & 3/4 in.)
3. Fixed End Wrenches (13/16 in. & 3/4 in.)

3
3I
,
3
3J
1
3
3I
1
3
3I

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<p>SEWAGE PUMP INSTALLATION</p> <p>MACHINIST TOOLS REQUIRED</p> <p>1. Ratchet (1/2 in. Drive)</p> <p>2. Sockets (13/16 in. & 1-1/8 in.)</p> <p>3. Fixed End Wrenches (13/16 in. & 1-1/8 in.)</p> <p>4. Portable Magnetic Base Drill</p> <p>5. Drill Bits (21/32 in., 25/32 in. & 17/64 in.)</p>		

BRIDGE CRANE AND RAILS INSTALLATION

MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel Scale
3. Hammer
4. Center Punch
5. Ratchet (1/2 in. Drive)
6. Sockets (5/16 in., 7/16 in. & 3/4 in.)
7. Portable Electric Hand Drill
8. Drill Bits (1/8 in., 17/64 in., 21/32 in., & 25/32 in.)
9. Scriber
10. Allen Wrenches (3/8 in. & 5/16 in.)
11. Chalkline

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CONVECTION OVEN
MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel Scale (Rigid)
3. Hammer
4. Center Punch
5. Ratchet (1/2 in. Drive)
6. Socket (3/4 in.)
7. Drill bits (1/8 in. & 9/16 in.)
8. Taps (for 1/2-13 UNC 2A)

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HOIST AND MONORAIL INSTALLATION

MACHINIST TOOLS REQUIRED

1. 8 ft. Steel Tape
2. 6 in. Steel Scale
3. Hammer
4. Center Punch
5. Ratchet (1/2 in. Drive)
6. Socket (3/4 in.)
7. Portable Electric Hand Drill
8. Drill Bits (1/8 in. & 7/32 in.)
9. Scriber
10. Allen Wrench (5/16 in.)
11. Chalkline

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COOLING COIL INSTALLATION
MACHINIST TOOLS REQUIRED

1. Hammer
2. Center Punch
3. Scriber
4. Drill Bits (13/64 in. & 19/32 in.)
5. 3/4 in. Socket
6. Ratchet (1/2 in. Drive)

PERSONAL FATIGUE AND DELAY FACTOR

The PFD (Personal, Fatigue and Delay) Factor for Outside Machinery Shipboard items is twenty percent (20%). The development of this factor is as follows:

<u>ALLOWANCE</u>	<u>VALUE (%)</u>
Personal Delays	5
Basic Fatigue	4
Additional Fatigue:	
Noise Level (Intermittent -Loud)	2
Unavoidable Delays	9
Avoidable Delays	0
Total	<u>20%</u>

The preceding percentages were developed using information from the following sources:

- o Handbook of Industrial Engineering, pages 4.4.18 thru 4.4.22, copyright 1982.
- o The experience of Ingalls Shipbuilding Industrial Engineering Staff.

The definitions of these delay allowances are as follows:

- PERSONAL DELAY - The time required for an employee to take care of all personal needs such as trips to drinking fountain and rest room.
- BASIC FATIGUE - A reduction in the employee's capacity to perform work. The basic fatigue factor (4%) includes those influences that are common to all types of work.
- ADDITIONAL FATIGUE - A reduction in the employee's capacity to perform work caused by factors such as use of muscular force, poor lighting, atmospheric conditions, noise level, mental strain and monotony.
- UNAVOIDABLE DELAY - This delay includes legitimate interruptions in the work cycle caused by other employees, material irregularities, and machine interference.
- AVOIDABLE DELAY - This delay includes interruptions which are not allowed and can be controlled by good supervision. Examples of this delay would include visiting with other employees for personal reasons, smoking, eating a sandwich, reading non-work related material, etc.

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8.01 CARE OF EQUIPMENT

The operator assigned to the particular work station is responsible for the lubrication, minor maintenance, and cleanliness of the equipment at the work station and for the cleanliness of the area in and around the work station.

8.02 QUALITY ASSURANCE AND INSPECTION

1. General Responsibilities

A. The Vice President of Quality Assurance is responsible for the development and maintenance of a Quality Assurance Program responsive to the requirements of each contract. The Quality Assurance Program requirements as defined by the Quality Assurance organization will be incorporated into company policies, standard procedures, drawings and technical specifications, as appropriate, by each organization responsible for deliverable end items.

B. The Quality Assurance organization is responsible for assuring quality requirements are invoked on suppliers as well as on Ingalls organizations producing an end item, for measuring the effectiveness of the Quality Assurance Program, and for assuring appropriate corrective action is taken by the organization responsible for departure from quality requirements.

c. Each member of management is responsible to accomplish work in accordance with governing contractual drawings and specifications, approved technical specifications, drawing and other Ingalls documents issued for material and equipment acquisition, to define a process, or test a deliverable product.

2. Specific Responsibilities

Inspectors - Qualified personnel who have been selected and authorized to perform inspection tasks. This is a term used throughout all Quality Assurance (QA) procedures and Quality Work Instructions (QWI's) to include personnel who have been assigned either limited or full inspection responsibility. This includes inspectors within, or designated inspectors outside the QA organization. The use of the term "inspector" is to be construed to mean "within the authority and responsibility authorized by the Vice President, Quality Assurance".

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OPERATION TITLE • JOB PREPARATION

8.02 QUALITY ASSURANCE AND INSPECTION (Continued)

Quality Assurance inspectors or personnel within the QA organization who are authorized to perform specified inspection functions are:

- a. Quality Assurance Inspectors (QAI)
- b. Quality Engineering & Systems Personnel (QE&S)
- c. Quality Assurance Receipt Inspectors (QARI)
- d. Quality Assurance Supplier Control Field Representative (QFR)
- e. Quality Assurance Preventive Maintenance Surveillance Inspectors (QAPMS)

Responsibilities - Building adequate quality into the product is the primary responsibility of craft supervision. It is the responsibility of Quality Assurance and the designated inspection agencies to inspect early in the process and at critical points to assure that the process is under control and that the product at the various stages meets quality and technical workmanship established by drawings, Manufacturing Standard Processes, as well as those requirements verified to be in accordance with the practices and instructions embodied in applicable QWI's, Standard Procedures (SP's) and Departmental Operating Instructions (DOI's).

Determination of the level of quality required to meet contractual requirements is the responsibility of QA. QAI has the responsibility for the application of the quality requirements embodied in the drawings, MSP's and QWI's to the product. The resolution of problems arising from instances of the customer applying a higher level of quality than that required by QA shall be through the Material Review System; specifically, the resolution of such problems has been delegated to Quality Assurance (Quality Engineering and System). The inspection process shall be audited, system data shall be analyzed for trends and recurring quality problems shall be investigated. Corrective action commitments shall be obtained by QE&S.

Inspection - The task performed by an authorized inspector to the requirements of the governing Ingalls drawings defining the product, its assembly or its installation, and to Manufacturing Standard Processes (MSP's) of the current issue, utilizing the applicable Quality Work Instructions (QWI) for the specific discipline or type of inspection. The scope of the inspection shall be defined by the governing work authorization, supplemented as necessary by the releasing craft or (Production Control) to define the boundaries or extent of the work released for inspection.

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FROM: SHIP

TO: SUPPORT AREA

FROM	TO	DISTANCE ONE WAY	TMU's	CODE
12 Module 1 Stairs	8 Tool Rm Bay 3	525 ft.	3627	1002.201
12 "	9 Repro Track 2	188 ft.	1310	1002.202
12 "	5 Supv. Office Trk 1	388 ft.	2450	1002.203
12 "	2 Tool Room Wet Dock Bldg	1375 ft.	9494	1002.204
12 "	10 Production Control	638 ft.	4406	1002.205
12 "	21 Warehouse 301	2600 ft.	17952	1002.206
13 Module 2 Stairs	8 Tool Room Bay 3	156 ft.	1130	1002.207
13 "	9 Repro Track 2	388 ft.	2700	1002.208
13 "	5 Supv. Office Track 1	875 ft.	6040	1002.209
13 "	2 Tool Room Wet Dock Bldg	1775 ft.	12256	1002.210
13 "	10 Production Control	1050 ft.	7250	1002.211
13 "	21 Warehouse 301	2838 ft.	19595	1002.212

NOTES: Values for one person. No PFD allowance is included in these values.

INGALLS Shipbuilding	<h1 style="text-align: center;">WM - MANUAL</h1>	CODE
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8.07 TIME AND PRODUCTION REPORTING

The supervisor fills out a daily time card for each employee charging the appropriate number of hours to the hull, account, and berth number.

8.08 SET-UP AND TEAR DOWN

Set-up and tear down of a machine is the responsibility of the operator assigned to the work station. After each use the machine is restored to its original condition.

8.09 SUPERVISORY RESPONSIBILITY

To plan, organize, and supervise the activities of workmen on surface ships in accordance with established policies, procedures, practices, agreements between Company and represented employees.

To assign craftsmen to perform the preplanned and scheduled work according to drawings and specifications, satisfying the requirements of allowed work standards, acceptance tests, quality standards of workmanship, scheduled completion dates, and budgeted manpower allotments.

To be the primary liason between the Company and the represented employees, communicating the Company objectives to the workers, and keeping the Company informed of general attitudes of employees.

8.10 OUTSIDE MACHINIST DUTIES AND RESPONSIBILITIES

I. OCCUPATIONAL SUMMARY:

Performs the installation, alignment and repair of machinery aboard ship.

II. DUTIES AND RESPONSIBILITIES:

Works from drawings, various technical manuals and engineering documents in accordance with recognized and accepted trade practices.

Uses all standard tools such as machinist hand tools and precision measuring devices such as micrometers, dial indicators and calipers.

INGALLS
Shipbuilding

MANUAL

OPERATION TITLE: DRILLING

SEE THE FORMS & DATA

8.10 OUTSIDE MACHINIST DUTIES AND RESPONSIBILITIES (Continued)

Installs according to specification; auxiliary machinery, main propulsion equipment, ordnance, elevators, conveyors, mast antennas, windows, signal devices, boilers, and related equipment, shop machinery, galley equipment, laundry equipment, vent fans, coolers, pumps, motors, compressors, distillers, generators, sea valves, reach rods, refrigeration units and air conditioning units, stern tubes, rudders, and propellers. Also operates portable milling and boring machines.

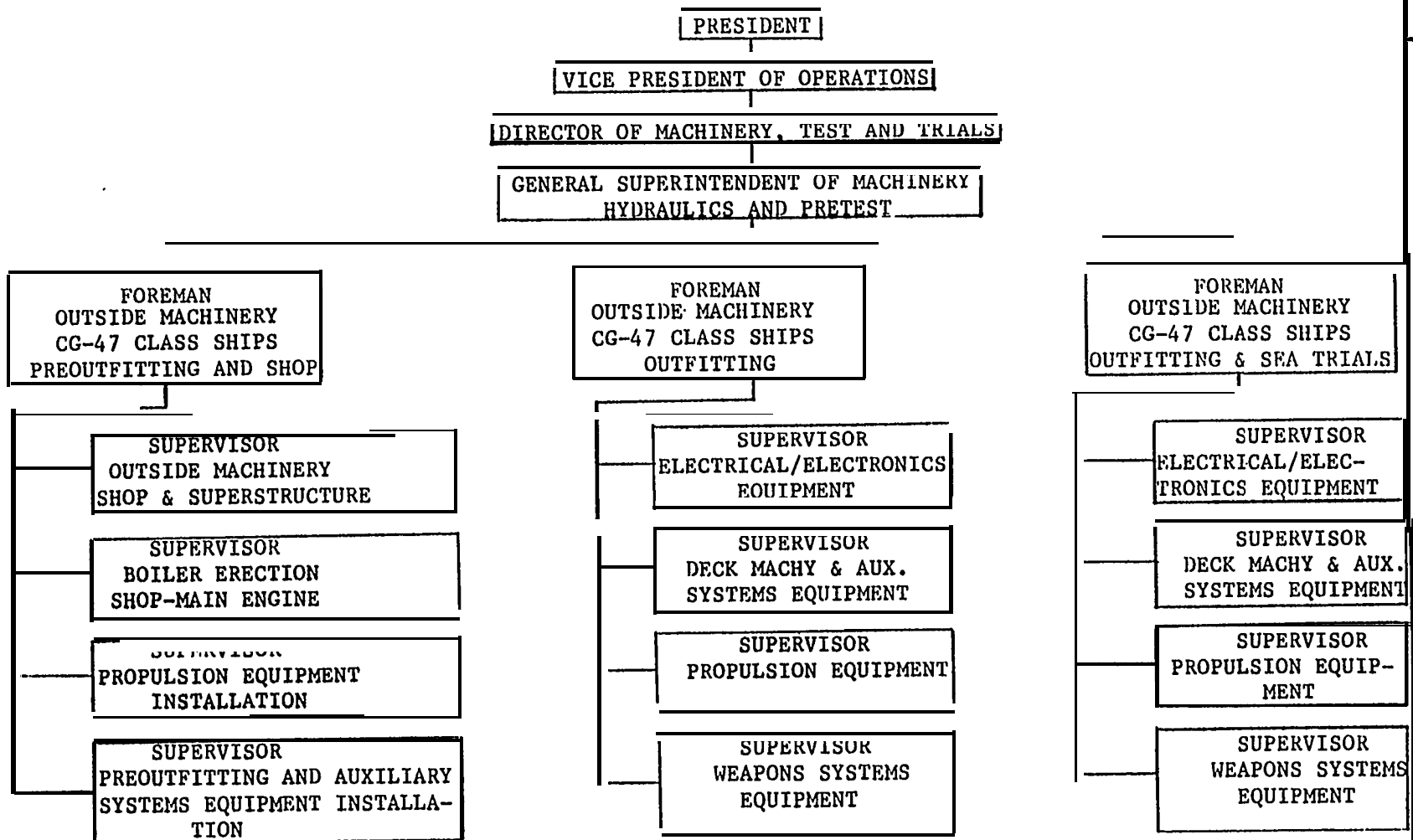
Installs various deck machinery such as windlasses, capstans, winches and boat handling gear.

Mounts electronic consoles and various electrical control panels.

Assists in various operational tests on installed machinery and equipment.

The duties described herein cover major duties required. However, this does not exclude the requirement of performing related and other duties as directed by supervision.

ORGANIZATION CHART

NGALLS
Shipbuilding

SECT. 8 STANDARD PRACTICES AND POLICIES

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PAGE 8-7

INGALLS Shipbuilding	WM - MANUAL	CODE
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	SECTION 9: PROCESS DATA	SIGN. TLC
		PAGE 9-1

Included in this section is the detail information for the derivation of the process times for machining operations used in this manual. Below is an index showing how this section is constructed.

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B) Material and Condition Code Description Matrix	9-3
C) Drilling Process Time Charts	9-24
D) Drilling Process Time Formula Derivation	9-39
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2. STERN TUBE BORING PROCESS TIME	
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B) Face Milling Process Time Formula Derivation	9-53

DRILLING PROCESS TIME

How to use this section to determine process times.

In order to use this section of the manual to determine drilling process times, a three step procedure must be followed.

- o First, the material and condition code must be determined for the material which is being drilled. This is done by following the procedure outlined on page 9-3.
- Ž Second, the process time (for drilling a one inch deep hole) at the given hole diameter for the appropriate material and condition code can be determined from the process time charts pages 9-25 through 9-38.
- 0 Third, the process time for the appropriate hole depth (including lead time) must be determined by the procedure outlined on page 9-24.

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	SECTION 5 LAYOUTS AND MATERIAL FLOW	SIGN.	TLC/FWM
		PAGE	5-1

MATERIAL AND CONDITION CODE
DESCRIPTION MATRIX

;

This section shows the four digit material and condition code (pages 9-4 thru 9-23). It also describes the material in terms of the AISI (American Iron and Steel Institute) number or other material designation, the Brinell hardness, and a description of the processing the material has undergone (ex. quenching, annealing, cold drawing, hot rolling etc.)

Considerable time and attention has been given to the problem of finding commercial equivalent materials to specific military specification (Mil-spec) numbers. After researching this problem extensively and collaborating with a metallurgist at the National Bureau of Standards it was determined that three characteristics of a material could be used to select the material and condition code from a mil-spec. The systematic method of selection is as follows:

- o The first step is to determine the major class of the material (ex. Plain Carbon Steel, Alloy Steel, Aluminum, Copper etc.).
- 0 The second step is to determine the carbon content for steels only. (Note the last two digits of an AISI number denote the carbon content. For example: 1010 steel has .1% carbon content).
- 0 The third step is to determine the Brinell hardness which is affected by the processing method (Quenching, Annealing, Cold Rolling etc. Note: If only the tensile strength is known, then the Brinell hardness can be approximated for steels by dividing the tensile strength in psi by 500.

The determination of these values will point to a specific material and condition code.

NOTE: The material and condition code description matrix was taken from "Machining Data Handbook", Metcut Research Associates Inc., (June 1966) p. 221-240.

MATERIAL AND CONDITION CODE DESCRIPTION MATRIX													
MATERIAL AND CONDITION CODE	MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL WATERI.
					NOMINAL HOLE DIAMETER - Inches								
					1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
0001	FREE MACHINING PLAIN CARBON STEELS	100 to 150	Hot Rolled or Annealed	90 115	.001 -	.003	.005	.010	.015	.018	.020	.025	M10 M7 M1
	Resulphurized 8111 1119 8112 1212 8113 1213 1113 1213+Te	150 to 200	Cold Drawn	100 120	.001 -	.003	.005	.010	.015	.018	.020	.025	M10 M7 M1
0002													
0003	Resulphurized 1108 1120 1109 1126 1115 1144 1117 1211 1118	100 to 150	Hot Rolled or Annealed	70 90	.001 -	.003	.005	.010	.015	.018	.020	.023	M10 M7 M1
0004		150 to 200	Cold Drawn	70 90	.001 -	.003	.005	.010	.015	.018	.020	.025	M10 M7 M1
0005		175 to 225	Hot Rolled, Normalized, Annealed or Cold Drawn	70 90	.001 -	.003	.005	.010	.015	.018	.020	.023	M10 M7 M1
0006	Resulphurized 1132 1141 1137 1145 1138 1146 1139 1151 1140	275 to 325	Quenched and Tempered	65	-	.002	.004	.006	.010	.012	.015	.018	M10 M7 M1
0007		325 to 375	Quenched and Tempered	40	-	.002	.003	.006	.008	.009	.010	.011	T15 M33
0008		375 to 425	Quenched and Tempered	30	-	.002	.003	.005	.007	.009	.010	.010	T15 M33
0009		100 to 150	Hot Rolled, Normalized, Annealed or Cold Drawn	80 105	.001 -	.003	.005	.010	.015	.018	.020	.025	M10 M7 M1
0010	Loaded 10L10 12L13 10L20 12L14	150 to 200	Hot Rolled, Normalized, Annealed or Cold Drawn	80 110	.001 -	.003	.005	.010	.015	.018	.020	.025	M10 M7 M1
0011		200 to 250	Hot Rolled, Normalized, Annealed or Cold Drawn	60 75	.001 -	.003	.004	.007	.010	.012	.015	.018	M10 M7 M1

MATERIAL AND CONDITION CODE DESCRIPTION MATRIX

MATERIAL AND
CONDITION CODE

0012

0013

0014

0015

0016

0017

0018

0019

0020

0021

0022

MATERIAL	HARD- NESS DMM	CONDITION	SPEED fpm	FEED - inches Per Revolution								HSS TOOL MATERIAL	
				NOMINAL HOLE DIAMETER - inches									
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2		
PLAIN CARBON STEELS	85 to 125	Hot Rolled, Normalized, Annealed or Cold Drawn	70	.001									M10
			90	-	.003	.005	.010	.015	.018	.020	.025	M7	
												M1	
	125 to 175	Hot Rolled, Normalized, Annealed or Cold Drawn	65	.001									M10
			80	-	.003	.005	.009	.012	.013	.018	.022	M7	
												M1	
	175 to 225	Hot Rolled, Normalized, Annealed or Cold Drawn	60	.001									M10
			70	-	.002	.004	.007	.010	.012	.015	.018	M7	
												M1	
	225 to 275	Annealed or Cold Drawn	50	-	.002	.004	.006	.010	.012	.015	.018		M10
											M7		
											M1		
	125 to 175	Hot Rolled, Normalized, Annealed or Cold Drawn	65	.001									M10
			80	-	.003	.004	.010	.012	.013	.018	.022	M7	
												M1	
	175 to 225	Hot Rolled, Normalized, Annealed or Cold Drawn	55	.001									M10
			70	-	.003	.004	.007	.010	.012	.015	.018	M7	
												M1	
	225 to 275	Hot Rolled, Normalized, Annealed, Cold Drawn or Quenched and Tempered	55	-	.002	.003	.006	.009	.010	.014	.016		M10
												M7	
												M1	
	275 to 325	Hot Rolled, Normalized, Annealed or Quenched and Tempered	45	-	.002	.003	.005	.008	.009	.011	.013		M10
											M7		
											M1		
325 to 375	Quenched and Tempered	40	-	.002	.003	.006	.008	.009	.010	.011		T15 M33	
375 to 425	Quenched and Tempered	30	-	.002	.003	.005	.007	.009	.010	.010		T15 M33	
FREE MACHINING ALLOY STEELS	150 to 200	Hot Rolled, Normalized, Annealed or Cold Drawn	65	.001									M10
			80		.003	.005	.009	.012	.013	.018	.022	M7	
													M1

1006 1016 1022
1008 1017 1023
1009 1018 1024
1010 1019 1025
1012 1020 1028
1015 1021

1027 1052
1030 1055
1033 1060
1034 1062
1035 1064
1036 1065
1037 1066
1038 1070
1039 1074
1040 1070
1041 1080
1042 1084
1043 1095
1045 1086
1046 1090
1048 1095

Resulphurized
3140 4150
4140 6640

MATERIAL AND CONDITION CODE
DESCRIPTION MATRIX

MATERIAL AND
CONDITION CODE00230024002500260027002800290030003100320033

MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								WSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
FREE MACHINING ALLOY STEELS (cont.) <div>Resulphurized 3140 4150 4140 8840</div>	200 to 250	Hot Rolled, Normalized, Annealed or Cold Drawn	60 75	.001 -	.003	.004	.007	.010	.012	.015	.018	M10 M7 M1
	275 to 325	Quenched and Tempered	50	-	.002	.003	.006	.009	.010	.014	.016	M10 M7 M1
	325 to 375	Quenched and Tempered	35	-	.002	.003	.006	.008	.009	.010	.011	T15 M33
	375 to 425	Quenched and Tempered	25	-	.002	.003	.005	.007	.009	.010	.010	T15 M33
	45R _C to 48R _C	Quenched and Tempered	20	-	.0005	.001	.002	.002	.003	.003	.004	T15 M33
<div>Loaded 41L30 51L32 41L40 88L70 41L47 88L40 41L50 52L100 43L47</div>	150 to 200	Hot Rolled, Normalized, Annealed or Cold Drawn	70 90	.001 -	.003	.005	.010	.015	.018	.020	.025	M10 M7 M1
	200 to 250	Hot Rolled, Normalized, Annealed or Cold Drawn	65 80	.001 -	.003	.004	.007	.010	.012	.015	.018	M10 M7 M1
	275 to 325	Quenched and Tempered	60	-	.002	.004	.006	.010	.012	.015	.018	M10 M7 M1
	325 to 375	Quenched and Tempered	40	-	.002	.003	.006	.008	.009	.010	.011	T15 M33
	375 to 425	Quenched and Tempered	25	-	.002	.003	.005	.007	.009	.010	.010	T15 M33
	45R _C to 48R _C	Quenched and Tempered	20	-	.0005	.001	.002	.002	.003	.003	.004	T15 M33

MATERIAL AND CONDITION CODE DESCRIPTION MATRIX

MATERIAL AND
CONDITION
CODE

MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
ALLOY STEELS	125 to 175	Hot Rolled, to Annealed or Cold Drawn	60 75	.001 - .003	.004 .007 .010	.012 .015 .018	.015 .018 .021				M10 M7 M1	
	175 to 225	Hot Rolled, to Annealed or Cold Drawn	65	- .002	.004 .006 .010	.012 .015 .018	.015 .018 .021				M10 M7 M1	
	225 to 275	Hot Rolled, Normalized, Annealed or Cold Drawn	55	- .002	.004 .005 .008	.010 .012 .015	.015 .018 .021				M10 M7 M1	
	275 to 325	Hot Rolled, Normalized, Cold Drawn or Quenched and Tempered	50	- .002	.003 .005 .008	.010 .012 .015	.015 .018 .021				M10 M7 M1	
	325 to 375	Normalized to or Quenched and Tempered	40	- .002	.003 .006 .008	.010 .012 .015	.015 .018 .021				T15 M33	
	375 to 425	Quenched and Tempered	30	- .002	.003 .005 .007	.010 .012 .015	.015 .018 .021				T15 M33	
	175 to 225	Hot Rolled, Normalized, Annealed or Cold Drawn	60	- .003	.004 .007 .010	.012 .015 .018	.015 .018 .021				M10 M7 M1	
	225 to 275	Normalized, Cold Drawn or Quenched and Tempered	50	- .002	.005 .006 .008	.010 .012 .015	.015 .018 .021				M10 M7 M1	
	275 to 325	Normalized to or Quenched and Tempered	45	- .002	.003 .005 .008	.010 .012 .015	.015 .018 .021				M10 M7 M1	
	325 to 375	Normalized to or Quenched and Tempered	35	- .002	.003 .006 .008	.010 .012 .015	.015 .018 .021				T15 M33	
	375 to 425	Quenched and Tempered	25	- .002	.003 .005 .007	.010 .012 .015	.015 .018 .021				T15 M33	

1320	4128	6120
2317	4317	6317
2512	4320	6325
2515	4608	6415
2517	4615	6115
3115	4617	6615
3120	4620	6617
3125	4621	6620
3310	4720	6622
3316	4815	6625
4012	4817	6627
4017	4820	6720
4023	5015	6822
4024	5020	6310
4027	5024	6315
4028	5120	64015
4118	6118	64017
4125		

1330	4337	6280
1332	4340	6270
1335	4640	6290
1340	50840	6342
1345	50844	6382
2330	5045	6440
2335	50846	6475
2340	50850	61845
2345	50869	6630
3130	5075	6637
3135	5080	6640
3140	5130	6642
3141	5132	6645
3145	5135	66845
3150	5140	6650
4030	5145	6655
4032	5147	6660
4037	5150	6740
4042	5155	6742
4047	5160	6255
4063	51668	6260
4130	50100	6262
4135	51100	64830
4137	52100	64840
4140	6145	6445
4142	6150	6440
4145	6160	6445
4147	6240	6450
4150	6250	

1320 4128 6120
2317 4317 6317
2512 4320 6325
2515 4608 6415
2517 4615 6415
3115 4617 6615
3120 4620 6617
3125 4621 6620
3310 4720 6622
3316 4815 6625
4012 4817 6627
4017 4820 6720
4023 5015 6822
4024 5020 6818
4027 5024 6815
4028 5120 64015
4118 6118 94017
4125

1330 4337 6200
1332 4340 6270
1335 4640 6290
1340 50040 6342
1345 50044 6382
2330 5040 6440
2335 5046 6475
2340 5050 61845
2345 5069 6630
3130 5075 6637
3135 5080 6640
3140 5130 6642
3141 5132 6645
3145 5135 66845
3150 5140 6650
4030 5145 6655
4032 5147 6660
4037 5150 6740
4042 5155 6742
4047 5160 9255
4063 5166 9280
4130 50100 9282
4135 51100 94030
4137 52100 94040
4140 6145 9445
4142 6150 9840
4145 6180 9845
4147 6240 9850
4150 6250

MATERIAL AND CONDITION CODE
DESCRIPTION MATRIX

MATERIAL AND
CONDITION CODE

MATERIAL	HARD NESS BHN	CONDITION	SPEED fpm	FEED - Inches For Revolution							MSS TOOL MATERIAL	
				HOLE DIAMETER - Inches								
							1/2	3/4	1	1-1/2		2
ALLOY STEELS (cont.) <div>330 4337 8288 1332 4340 8270 1335 4640 8218 1340 50840 6342 • • • (SEE PAGE 224 For COMPLETE MATERIAL LIST)</div>	45R, to 48R,	Quenched and Tempered	20				.002	.002	.003	.003	.004	T15 M33
	48R to 50R	Quenched and Tempered	20				.002	.002	.003	.003	.004	T15 M33
	50R, to 52R,	Quenched and Tempered	15				.002	.002	.003	.003	.004	T15 M33
NITRIDING STEELS <div>Nitralloy 125N Nitralloy 135C Nitralloy 135M Nitralloy N Nitralloy 230</div>	200 to 250	Annealed	50				.003	.008	.010	.011	.013	M10 M7 M1
	300 to 350	Normalized or Quenched and Tempered	35				.006	.008	.009	.010	.011	T15 M33
ARMOR PLATE <div>MIL-A-1268 (GRD)</div>	250 to 320	Quenched and Tempered	25				.003	.005	.006	.007	.008	T15 M33
ULTRA-HIGH STRENGTH STEELS <div>88AC MX-2 4340</div>	200 to 250	Annealed	55				.005	.008	.010	.011	.013	M10 M7 M1
	250 to 300	Normalized	50				.006	.008	.009	.010	.011	M10 M7 M1
	30R _c to 38R _c	Quenched and Tempered	20				.003	.003	.004	.005	.005	T15 M33
	38R _c to 40R _c	Quenched and Tempered	20			.00	.002	.002	.003	.003	.004	T15 M33
	40R _c to 42R _c	Quenched and Tempered	15				.002	.002	.003	.003	.004	T15 M33

MATERIAL AND CONDITION CODE DESCRIPTION MATRIX

MATERIAL AND
CONDITION CODE

MATERIAL	HARD- NESS BHN	CONDITION	SPEED ipm	FEED - Inches Per Revolution								TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
ULTRA-HIGH STRENGTH STEELS (cont.) <div>M11 M13</div>	200 to 250	Annealed	50	-	.002	.003	.005	.008	.010	.011	.013	M10 M7 M1
	250 to 300	Normalized	45	-	.002	.003	.006	.008	.009	.010	.011	M10 M7 M1
	43R _C to 48R _C	Quenched and Tempered	20	-	.001	.002	.003	.003	.004	.005	.005	T15 M33
	48R _C to 50R _C	Quenched and Tempered	15	-	.0005	.001	.002	.002	.003	.003	.004	T15 M33
	50R _C to 52R _C	Quenched and Tempered	10	-	.0005	.001	.002	.002	.003	.003	.004	T15 M33
<div>Machining Steels 18S Ni, Grade 280 18S Ni, Grade 250 18S Ni, Grade 300</div>	275 to 325	Annealed	45	-	.002	.003	.005	.008	.009	.011	.013	T15 M33
	50R _C to 52R _C	Quenched and Tempered	30	-	.001	.002	.003	.003	.004	.005	.005	T15 M33
<div>Machining Steels 25S Ni</div>	175 to 225	Annealed	50	-	.002	.003	.006	.009	.010	.014	.016	T15 M33
	50R _C to 52R _C	Quenched and Tempered	20	-	.001	.002	.003	.003	.004	.005	.005	T15 M33
<div>MP9-4-25</div>	325 to 375	Annealed	35	-	.002	.003	.005	.007	.008	.009	.010	T15 M33
	43R _C to 48R _C	Quenched and Tempered	30	-	.002	.003	.005	.007	.008	.009	.010	T15 M33

MATERIAL AND CONDITION CODE
DESCRIPTION MATRIX

MATERIAL AND CONDITION CODE	Mk1M1L	NEED KISS mk .	Cmlrlw	\$fmo 'm	FEED - Inches Per Revolution								H low 111m11
					Mmlulllmollzma- indm								
					VII	I/1	1/4	1/3	3/4	I	1-1/2	1	
0067	ULIRI-IIICT Slmncz11 SKt1\$(eont-) W4-4-4S n	325 to 375	Annealed	30	-	.002	.003	.005	.007	.008	.009	.010	T15 M?
0068	100L slmls Hlcn sptod Ml mt la m 11 11 us 12	200 to 250	Asmea2ed	40	-	.002	.003	.005	.008	.003	.011	.013	M1'0' M7 M ^p
0069	Mlga p6 class I g: :4 m ga 14 m M4z 11	225 to 275	Annealed	30	-	.002	.003	.005	.008	.010	.011	.013	M10 Mi h11
0070	mlh SPS94 m ~j\$, \$ z m MS tla	225 to 275	Annea3sd	Zo	-	.001	.002	.004	.005	.006	.007	.008	M1 M7 M1
0071	Hat lolk RIO 1114 H11 H119	150 to 200	AnneAm3	55	-	.002	.003	.006	.009	.011	.014	.016	Mi Mi- M1
0072	D-1113	200 to 250	Anneal ad	45	-	.002	.003	.005	.008	.010	.011	.013	MI M7 M ^p
0073	No! Wk 1121 1123 M1 H21 1124 M42 M22 NZS M42	150 to 200	Annealed	40	-	.002	.003	.005	.008	.009	.011	.013	M h. M7 M
0074		200 to 250	Anneal cd	30 8	-	.002	.003	.005	.008	.010	.011	.013	M10 M ^p M
0075		325 to 375	Quenched and Tempered	35	-	.002	.003	.005	.007	.008	.009	.010	T1 M ^p
0076	IPal mrk 1118 H14 1111 H15 1112 M1 1113	4aRc to soR ₁	C3umxhad and Tcmpered	15	-	.0005	.001	.002	.002	.003	.003	.004	T M33
0077		50Rc to 52Xc	Quanchcd and Tampered	10	.	.0005	.001	.002	.002	.003	.003	.004	T1 M33

MATERIAL AND CONDITION CODE DESCRIPTION MATRIX

MATERIAL AND
CONDITION CODE

MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
TOOL STEELS (cont.) <div>Cold Work A7 84 D1 85 D2 87 D3</div>	200 to 250	Annealed	25	-	.001	.002	.004	.005	.006	.007	.008	T15 M13
<div>Cold Work A2 A8 82 A3 A8 86 A4 A10 87 A5 81</div>	200 to 250	Annealed	40	-	.002	.003	.005	.008	.010	.011	.013	M10 M7 M1
<div>Shock Resisting S1 S5 S2 S6 S4 S7</div>	175 to 225	Annealed	50	-	.002	.003	.005	.009	.011	.014	.016	M10 M7 M1
<div>Hot P1 P4 P2 P5 P3 P6</div>	100 to 150	Annealed	65	-	.002	.004	.007	.010	.012	.015	.018	M10 M7 M1
<div>Hot P20 P21</div>	150 to 200	Annealed	55	-	.002	.003	.006	.009	.011	.014	.016	M10 M7 M1
<div>Special Purpose L1 L3 L7 L2 L6</div>	150 to 200	Annealed	55	-	.002	.003	.006	.009	.011	.014	.016	M10 M7 M1
<div>Special Purpose F1 F2 F3</div>	200 to 250	Annealed	45	-	.002	.003	.005	.008	.010	.011	.013	M10 M7 M1
<div>Water Hardening W1 W4 W2 W5</div>	150 to 250	Annealed	85	-	.002	.004	.007	.010	.012	.015	.018	M10 M7 M1
CARBON STEELS <div>Carbon 1020 1025</div>	120 to 150	Annealed or Normalized	65 80	.001 -	.003 .005	.005 .007	.007 .012	.012 .013	.013 .018	.018 .022	.022	M10 M7 M1
<div>Carbon 1030 1050 1040 1070 1045</div>	125 to 175	Annealed	60 75	.001 -	.003 .005	.005 .009	.009 .012	.012 .013	.013 .018	.018 .022	.022	M10 M7 M1
	175 to 225	Normalized	50 65	.001 -	.002 .004	.004 .007	.007 .010	.010 .012	.012 .015	.015 .018	.018	M10 M7 M1

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
CAST STEELS (cont.)												
Corrosion Resistant CF-3(304L) CF-12M(316) CF-3M(316L) CF-20(302) CF-8(304) CG-8M(317) CF-8C(347) CH-20(309) CF-9M(318) CH-20(309)	140 to 190	Annealed	35	-	.002	.003	.006	.008	.009	.010	.011	M10 M7 M1
Heat Resistant HA HC(448) HU HM(327) HL HT(330)	160 to 210	As Cast	40	-	.002	.003	.005	.008	.009	.011	.013	M10 M7 M1
Heat Resistant HE(312) HK(318) HF(302B) HL HM(308) HU HI	160 to 210	As Cast	35	-	.002	.003	.006	.008	.009	.010	.011	M10 M7 M1
GRAY IRONS ASTM Classes 20 and 25 (Ferritic)	110 to 140	Annealed	80 140 230	.001 - .	.003 .003 .003	.006 .006 .006	.010 .010 .010	.012 .012 .012	.014 .014 .014	.018 .018 .018	.022 .022 .022	M10 M7, M1 C2 Carbide
ASTM Class 30 (Pearlitic - Ferritic)	150 to 190	As Cast	75 95 195	.001 - .	.003 .003 .003	.005 .005 .005	.008 .008 .008	.010 .010 .010	.012 .012 .012	.014 .014 .014	.015 .015 .015	M10 M7, M1 C2 Carbide
ASTM Classes 35 and 40 (Pearlitic)	190 to 220	As Cast	65 85 180	.001 - .	.003 .003 .003	.005 .005 .005	.008 .008 .008	.010 .010 .010	.012 .012 .012	.014 .014 .014	.015 .015 .015	M10 M7, M1 C2 Carbide
ASTM Classes 45 and 50 (Pearlitic + Free Carbides)	220 to 260	As Cast	55 70 160	.001 - .	.002 .002 .002	.004 .004 .004	.006 .006 .006	.008 .008 .008	.010 .010 .010	.012 .012 .012	.014 .014 .014	M10 M7, M1 C2 Carbide
ASTM Classes 55, 60 & 60+ (Pearlitic and Acicular + Free Carbides)	250 to 320	As Cast or Quenched and Tempered	45 95	- .	.001 .001	.003 .003	.005 .005	.007 .007	.009 .009	.012 .012	.012 .012	M10 M7, M1 C2 Carbide
DUCTILE IRONS Ferritic 60-40-18 65-45-12	140 to 190	Annealed	80 100	.001 -	.003 .003	.005 .005	.008 .008	.010 .010	.012 .012	.014 .014	.015 .015	M10 M7 M1
Ferritic - Pearlitic 60-55-08	190 to 225 225 to 260	As Cast As Cast	60 45	- -	.002 .002	.004 .003	.006 .006	.008 .008	.010 .010	.012 .012	.015 .012	M10 M7 M1 M10 M7 M1

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								MSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
DUCTILE IRONS (cont.) <div>Pearlitic - Martensitic 100-70-03</div>	240 to 300	Normalized and Tempered	40	-	.002	.003	.006	.008	.010	.012	.012	M10 M7 M1
<div>Martensitic 120-90-02</div>	270 to 330	Quenched and Tempered	25	-	.001	.002	.004	.005	.006	.007	.008	M10 M7 M1
MALLEABLE IRONS <div>Ferritic 32518 35018</div>	110 to 160	Malleablized	120 1.7*	-	.002	.004	.007	.010	.012	.015	.018	M10 M7 M1
<div>Pearlitic 45007 48004 45010 50007</div>	160 to 220	Malleablized and Heat Treated	90 2.0*	-	.002	.004	.006	.008	.010	.015	.015	M10 M7 M1
	200 to 240	Malleablized and Heat Treated	75 1.5*	-	.002	.004	.006	.008	.010	.015	.015	M10 M7 M1
<div>Pearlitic 53004 60003</div>	200 to 255	Malleablized and Heat Treated	80 1.3*	-	.002	.004	.006	.008	.010	.015	.015	M10 M7 M1
<div>Pearlitic 80002</div>	240 to 280	Malleablized and Heat Treated	70 1.1*	-	.002	.004	.006	.008	.010	.015	.015	M10 M7 M1
FREE MACHINING STAINLESS STEELS <div>Ferritic 430F 430F(Ss)</div>	135 to 185	Annealed	100 140 ,	.001 - 	.003	.005	.010	.014	.018	.020	.025	M10 M7 M1
<div>Austenitic 303 303FF 303Se 347F(Ss)</div>	135 to 185	Annealed	80 100	.001 - 	.003	.005	.010	.014	.018	.020	.025	M10 M7 M1
	225 to 275	Cold Drawn	70 90	.001 - 	.003	.005	.010	.014	.018	.020	.025	M10 M7 M1
<div>Martensitic 418 418F</div>	135 to 185	Annealed	100 140	.001 - 	.003	.005	.010	.014	.018	.020	.025	M10 M7 M1

*If casting skin is removed multiply speed by this factor.

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL				
				NOMINAL HOLE DIAMETER - inches												
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2					
FREE MACHINING STAINLESS STEELS (cont.) <div>Martensitic 416 416F</div>	185 to 240	Annealed or Cold Drawn	100	.001									M10			
			130	-	.003	.005	.010	.014	.018	.020	.025	M7				
												M1				
	<div>Martensitic 416 416F</div>	275 to 325	Quenched and Tempered	50	.001								M10			
				65	-	.002	.004	.006	.008	.010	.014	.018	M7			
													M1			
	375 to 425	Quenched and Tempered	40	-	.001	.002	.004	.006	.008	.010	.010	M15				
												M33				
STAINLESS STEELS <div>Ferritic 405 436 446 438 442 499 434 443 502</div>				135 to 185	Annealed	60	-	.002	.003	.005	.008	.010	.014	.018	M10	
												M7				
												M1				
<div>Austenitic 201 304L 202 305 301 321 302 347 304 348</div>				135 to 185	Annealed	50	-	.002	.003	.005	.008	.010	.014	.016	M10	
															M7	
															M1	
					225 to 275	Cold Drawn	45	-	.002	.003	.005	.008	.011	.013	.016	M10
																M7
																M1
<div>Austenitic 302B 310S 317 309 314 318 309S 316 329 310 316L 330</div>				135 to 185	Annealed	45	-	.002	.003	.005	.008	.011	.013	.016	M10	
															M7	
															M1	
<div>Martensitic 403 420 410 501</div>				135 to 185	Annealed	55	.001								M10	
						70	-	.003	.004	.006	.008	.010	.014	.018	M7	
															M1	
				175 to 225	Annealed	60	-	.002	.003	.006	.008	.011	.011	.018	M10	
															M7	
															M1	
				275 to 325	Quenched and Tempered	50	-	.002	.003	.005	.008	.011	.013	.016	M10	
															M7	
											M1					
375 to 425	Quenched and Tempered	40	-	.001	.002	.004	.006	.008	.009	.009	.010	M15				
												M33				

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
STAINLESS STEELS (cont.) <div>Martensitic 414 422 431</div>	225 to 275	Annealed	50	-	.002	.003	.005	.008	.011	.013	.016	M10 M7 M1
	275 to 325	Quenched and Tempered	45	-	.002	.003	.005	.008	.011	.013	.016	M10 M7 M1
	375 to 425	Quenched and Tempered	40	-	.001	.002	.004	.006	.008	.009	.010	T15 M33
<div>Martensitic 418 440B 440A 440C</div>	225 to 275	Annealed	40	-	.002	.003	.005	.007	.010	.012	.013	M10 M7 M1
	275 to 325	Quenched and Tempered	35	-	.001	.002	.004	.005	.006	.008	.009	M10 M7 M1
	375 to 425	Quenched and Tempered	25	-	.001	.002	.003	.004	.005	.006	.007	T15 M33
	48RC to 52RC	Quenched and Tempered	20	-	.0005	.001	.002	.002	.003	.003	.004	T15 M33
PRECIPITATION HARDENING STAINLESS STEELS <div>17-4PH 17-7PH PH15-7Mo AISI 350 AISI 355 AISI 359</div>	150 to 200	Annealed	45	-	.002	.003	.005	.008	.010	.012	.015	M10 M7 M1
	275 to 325	Hardened	40	-	.001	.003	.005	.008	.008	.010	.012	M10 M7 M1
	325 to 375	Hardened	30	-	.001	.003	.004	.005	.007	.010	.012	T15 M33
	375 to 440	Hardened	20	-	.001	.002	.003	.004	.005	.006	.007	T15 M33

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
TITANIUM ALLOYS												
Commercially Pure 99.5	110 to 170	Annealed	80 100	.0005 -	.0005	.002	.006	.007	.008	.010	.013	M10 M7 M1
Commercially Pure 99.2 99.0 0.15 to 0.20 Pd	140 to 200	Annealed	65 80	.0005 -	.0008	.003	.006	.007	.008	.010	.013	M10 M7 M1
Commercially Pure 99.0 98.8	200 to 275	Annealed	40 50	.001 -	.002	.005	.006	.007	.008	.010	.013	M10 M7 M1
Alpha & Alpha-Beta Alloys 2Fe-2Cr-2Mo 5Al-2.5Sn 5Al-2.5Sn (low O) 7Al-2Cu-1Ta 4Al-3Mo-1V	300 to 340	Annealed	40	-	.002	.005	.006	.007	.008	.010	.011	M10 M7 M1
Alpha & Alpha-Beta Alloys 7Al-12Zr 6Al-4V 4Al-4Mo	310 to 350	Annealed	40	-	.002	.005	.006	.007	.008	.009	.010	M10 M7 M1
Alpha & Alpha-Beta Alloys 7Al-4Mo 6Al-1Mo-1V 5Al-1.25Fe-2.75Cr 5Al-1.5Fe-1.4Cr-1.2Mo 6Al-6V-2Sn-1(Fe,Cu)	320 to 370	Annealed	20	-	.002	.005	.006	.007	.008	.009	.010	M10 M7 M1
Alpha & Alpha-Beta Alloys 1Al-8V-5Fe	320 to 380	Annealed	15	-	.002	.004	.005	.006	.007	.008	.009	T15 M33
Alpha & Alpha-Beta Alloys 6Al-4V 4Al-4Mo	350 to 400	Solution Treated and Aged	25	-	.001	.002	.004	.005	.006	.007	.008	T15 M33
Alpha & Alpha-Beta Alloys 2Fe-2Cr-2Mo 5Al-1.25Fe-2.75Cr 6Al-6V-2Sn-1(Fe,Cu) 5Al-1.5Fe-1.4Cr-1.2Mo 7Al-4Mo and 4Al-3Mo-1V	375 to 420	Solution Treated and Aged	20	-	.001	.002	.003	.004	.004	.005	.005	T15 M33
Alpha & Alpha-Beta Alloys 1Al-8V-5Fe	375 to 440	Solution Treated and Aged	15	-	.0005	.001	.0015	.0015	.002	.002	.003	T15 M33
Beta Alloys 3Al-13V-11Cr	310 to 350	Solution Treated	20	-	.001	.003	.004	.005	.006	.007	.008	M10 M7 M1

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
TITANIUM ALLOYS (cont.) Beta Alloys 3Al-13V-11Cr	375 to 440	Solution Treated and Aged	15	-	.0005	.001	.0015	.0015	.002	.002	.003	T15 M33
Alpha & Alpha-Beta Alloys 2.5Al-16V 3Al-2.5V	150 to 200	Solution Treated	55 70	.001 -	.002	.005	.006	.008	.009	.010	.012	M10 M7 M1
	200 to 260	Annealed	50	-	.002	.005	.006	.008	.009	.010	.012	M10 M7 M1
HIGH TEMPERATURE ALLOYS Nickel Base - Wrought INCONEL 721 (INCONEL 8) INCONEL 722 (INCONEL 9) INCONEL 2-750 (INCONEL X) INCONEL 751 (INCONEL 1550) INCONEL 700 UBINET 500 INCONEL 702 UBINET 700 INCONEL 718 UNITEMP 1753 INCONEL 601 WASTALLOY NIMONIC 75 RENE' 41 NIMONIC 80 RENE' 80 NIMONIC 80 H252 NIMONIC 85	200 to 300	Annealed or Solution Treated	20	-	.001	.001	.003	.005	.007	.010	.010	T15 M33
	300 to 400	Solution Treated and Aged	15	-	.001	.001	.003	.006	.007	.010	.010	T15 M33
Nickel Base - Wrought HASTELLOY B HASTELLOY X INCOLOY 804 INCONEL 600 (INCONEL) INCONEL 604 (INCONEL 600) REFRACTALLOY 20	140 to 220	Annealed	30	-	.002	.004	.006	.007	.010	.012	.012	T15 M33
	280 to 310	Cold Drawn	20	-	.001	.002	.003	.005	.007	.010	.010	T15 M33
Nickel Base - Cast NIMONIC 75 HASTELLOY B NIMONIC 80 HASTELLOY C NIMONIC 80 INCONEL 713C NIMONIC 93 HAR-B200 NIMONIC 100 GR235 UBINET 500 UBINET 700 H252 B1800 IN-100	250 to 350	As Cast	10	-	.001	.001	.002	.004	.006	.007	.008	T15 M33
Cobalt Base - Wrought HAYNES ALLOY 25 1-150 1-1050 S-016 V-36	180 to 230	Solution Treated	25	-	.002	.004	.006	.007	.010	.012	.012	T15 M33
	270 to 320	Solution Treated and Aged	15	-	.001	.002	.003	.005	.007	.010	.010	T15 M33
Cobalt Base - Cast HAYNES ALLOY 30 W1-32 HAYNES STELLITE 6 HAYNES STELLITE 21 HAYNES STELLITE 31 HAR-B302 HAR-B322	220 to 290	As Cast	10	-	.001	.001	.002	.004	.006	.007	.008	T15 M33

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
HIGH TEMPERATURE ALLOYS (cont.) <div>Iron Base - Wrought INCOLOY 800 10-25-8 INCOLOY 801 10-9-8L INCOLOY 803 A-298 INCOLOY 8155 8545 INCOLOY 8155 Y-51</div>	180 to 230	Solution Treated	20	-	.002	.004	.006	.007	.010	.012	.012	T15 M33
	250 to 320	Solution Treated and Aged	15	-	.002	.004	.006	.007	.010	.012	.012	T15 M33
<div>Nickel Base - Wrought TO Nickel</div>	180 to 200	As Rolled	50	-	.002	.004	.007	.009	.010	.012	.012	M10 M7 M1
REFRACTORY ALLOYS*	180 to 200	Pressed and Sintered	<p><u>Tungsten Drilling Recommendation</u></p> <p>Since tungsten is very brittle, there is a tendency for chipping to occur as the drill enters and leaves the workpiece. Solid carbide drills must be used since tool wear is very rapid. In order to minimize the tendency of the tungsten to chip at the edges of the hole, it is suggested that the <u>workpiece be heated to 400°-600° F</u> before drilling. The following machining conditions are suggested:</p> <p>Drill: 118°/90° notched point, 10° clearance</p> <p>Drill material: C-2 Carbide</p> <p>Cutting speed: 200 ft./min.</p> <p>Feed: .002 in./rev. for a 1/16" dia. drill</p> <p>Lubricant: Molybdenum disulfide (MoS₂) powder in air stream</p> <p>Drilling by Electrical Discharge Machining (EDM) should also be considered as an alternative, especially for fragile parts.</p>									
<div>Tungsten Alloys Tungsten, 85% density</div>	240 to 320	Pressed and Sintered										
<div>Tungsten Alloys Tungsten, 93% density</div>	240 to 320	Forged										
<div>Tungsten Alloys Tungsten, 98% density</div>	240 to 320	Arc Cast										
<div>Tungsten Alloys Tungsten, 99% density</div>	260 to 320	Pressed and Sintered										
<div>Tungsten Alloys Tungsten - 2 Thorium</div>	260 to 320	As Cast										
<div>Tungsten Alloys W-10Ag Gyroneel Mallory 2000</div>	290 to 320	Stress Relieved										
<div>Molybdenum Alloys Mo-5Ti Mo-30W TZM TZC</div>	220 to 290	75 100	.001 -	.003	.004	.007	-	-	-	-	-	T15 M33

*Due to the brittleness of refractory alloys, cracking, chipping, flaking and breakout tend to occur, particularly on the edges of the machined surfaces.

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
REFRACTORY ALLOYS* (cont.)												
Columbium Alloys Ch-752 D-31 D-43	170 to 225	Stress Relieved	50 75	.001 -	.003	.005	.007	-	-	-	-	T15 M33
Tantalum Alloys Ta-10W	200 to 250	Stress Relieved	50 50	.001 -	.002	.002	.004	-	-	-	-	T15 M33
NICKEL ALLOYS												
NICKEL 200 (100% NICKEL) NICKEL 201 (LOW CARBON Ni) NICKEL 205 (100% NICKEL) NICKEL 211 (100% NICKEL) NICKEL 212 (100% NICKEL) NICKEL 233 (330 NICKEL) NICKEL 204 NICKEL 220 NICKEL 225 NICKEL 230	80 to 170	Annealed or Cold Drawn	65	-	.002	.003	.006	.008	.015	.018	.020	M10 M7 M1
MONEL 400 (MONEL) MONEL 401 MONEL 402 MONEL 403 MONEL 404 MONEL 501 GRAPHITIZED (OR MONEL)	115 to 240	Annealed or Cold Drawn	50	-	.002	.003	.006	.008	.010	.012	.015	M10 M7 M1
PERMANICKEL 300 (PERMANICKEL) DURANICKEL 301 (DURANICKEL) NI-SPAN-C 802 (NI-SPAN-C) MONEL K-500 (K MONEL)	150 to 320	Solution Treated	25	-	.002	.003	.006	.008	.010	.012	.015	T15 M33
	330 to 360	Aged	10	-	.001	.002	.003	.005	.007	.009	.011	T15 M33
Nitinol Alloys 55Ni-45Ti	210 to 230	Wrought	20	-	.001	.001	.002	.003	.004	.004	.005	T15 M33
Nitinol Alloys 58Ni-44Ti	300 to 340	Annealed	15	-	.001	.001	.002	.003	.004	.004	.005	T15 M33
	48R _C to 52R _C	Quenched	10	-	.001	.001	.002	.003	.003	.004	.005	T15 M33
Nitinol Alloys 60Ni-40Ti	290 to 320	Annealed	10	-	.001	.001	.002	.003	.003	.004	.005	T15 M33
ALUMINUM ALLOYS												
Non-Heat Treated Cast 13 112 212 360 43 113 8214 380 85 C113 8214 384 108 132 218 A812 A108 130 319	40 to 100 500K _C	As Cast	140 300	.001 -	.003	.007	.012	.016	.020	.025	.030	M10 M7 M1

*Due to the brittleness of refractory alloys, cracking, chipping, flaking and breakout tend to occur, particularly on the edges of the machined surfaces.

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MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL	
				NOMINAL HOLE DIAMETER - Inches									
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2		
ALUMINUM ALLOYS (cont.)	70	Solution Treated and Aged	140	.001									M10
Heat Treated Cast 40E 142 318 172 195 355 A132 8195 358 B132 228 750	to 125 500kg		250	-	.003	.007	.012	.016	.020	.025	.030	M7 M1	
Cold Drawn Wrought 1068 5005 5086 5454 1106 5052 5154 5456 3003 5056 5254 5852 3004 5063 5357 5856	30 to 80 500kg	Cold Drawn	140	.001								M10	
			250	-	.003	.007	.012	.016	.020	.025	.030	M7 M1	
Heat Treated Wrought 2011 2025 6061 6403 2014 2117 8062 7075 2017 2218 6063 7078 2018 4032 6151 7178 2024 6053 6262	75 to 150 500kg	Solution Treated and Aged	140	.001								M10	
			250	-	.003	.007	.012	.016	.020	.025	.030	M7 M1	
MAGNESIUM ALLOYS	40	As Cast, Annealed or Solution Treated and Aged	140	.001								M10	
Cast Alloys AM100A AZ10A EA41A ZE41A AZ31B AZ91A EZ33A ZM22 AZ31C AZ91B HM31A ZM22A AZ61A AZ91C HZ32A ZE51A AZ61A AZ91A H1A ZK61A AZ80A EA30A	to 70 500kg		330	-	.003	.007	.012	.016	.020	.025	.030	M7 M1	
Wrought Alloys A3A AZ10A HM31A T454A AZ31A AZ63 HM21A ZE10A AZ31B AZ62A HM31A ZE20A AZ31C AZ60A H1A ZE21A AZ60A AZ62 PE ZK60A AZ60A EZ33A	40 to 70 500kg	Annealed, Cold Drawn, Solution Treated and Aged	140	.001								M10	
			300	-	.003	.007	.012	.016	.020	.025	.030	M7 M1	
COPPER ALLOYS	20R _B	Annealed	140	.001	.003							M10	
314 LEADED COMM. BRONZE 332 HIGH LEADED BRASS 340 MEDIUM LEADED BRASS 342 & 353 HIGH Pb BRASS 350 EXTRA HIGH Pb BRASS 360 FREE CUTTING BRASS 370 FREE CUTTING BRASS 377 FURNACE BRASS 385 ARCHITECTURAL BRONZE 405 LEADED NAVAL BRASS 544 FREE CUT. PHOS. BRONZE	to 70R _B		175	-	-	.004	.008	.012	.018	.020	.022	M7 M1	
	60R _B	Cold Drawn	140	.001	.003							M10	
	to 100R _B		200	-	-	.004	.008	.012	.018	.020	.022	M7 M1	
278 JEWELRY BRONZE 290 RED BRASS 240 LOW BRASS 260 CARTRIDGE BRASS 70% 280 YELLOW BRASS 290 WHITE METAL 325 LOW LEADED BRASS 365 300 Pb WHITE METAL 443-445 INWB, ADMIRALTY 464 467 NAVAL BRASS 491 LOW SILICON BRONZE 495 HIGH SILICON BRONZE 515 BARIUM BRONZE 567 ALUMINUM BRASS 770 NICKEL SILVER 790 LEADED NICKEL SILVER	20R _B to 70R _B	Annealed	100	.001							M10		
			120	-	.003	.006	.010	.010	.015	.015	.020	M7 M1	
	60R _B	Cold Drawn	120	.001								M10	
	to 100R _B		140	-	.003	.006	.010	.010	.015	.015	.020	M7 M1	
102 OXYGEN FREE COPPER 110 ELECTROLYTIC TOWN PITCH COPPER 122 PHOS. SULFURIZED Cu 170, 172 & 175 HC-Cu 210 SILVER, 95% 220 COMMERCIAL BRONZE 302 PHOS. BRONZE 1.25% 510 PHOSPHOR BRONZE 5% 521 PHOSPHOR BRONZE 6% 524 PHOSPHOR BRONZE 10% 614 ALUMINUM BRONZE 700 COPPER NICKEL 10% 715 COPPER NICKEL 30% 745, 752, 754 & 757 Ni-Al	20R _B to 70R _B	Annealed	50	.001							M10		
			60	-	.003	.004	.008	.010	.012	.015	.020	M7 M1	
	60R _B	Cold Drawn	60	.001								M10	
	to 100R _B		75	-	.003	.004	.008	.010	.012	.015	.020	M7 M1	

MATERIAL AND CONDITION CODE DESCRIPTION MATRIX

MATERIAL AND
CONDITION CODE

0197

0198

0199

0200

0201

0202

0203

0204

0205

0206

0207

MATERIAL	HARD- NESS BHN	CONDITION	SPEED fpm	FEED - Inches Per Revolution								HSS TOOL MATERIAL
				NOMINAL HOLE DIAMETER - Inches								
				1/16	1/8	1/4	1/2	3/4	1	1-1/2	2	
ZINC ALLOYS SAE 903 SAE 925	80 to 100	Die Cast	225	.002	.003	.007	.012	.016	.018	.020	.025	M10 M7 M1
URANIUM	55R _A to 57R _A	As Cast or As Rolled	350	.001	.002	.003	.004	.005	.005	.005	.005	20%TaC 72%WC 8%Co
ZIRCONIUM	140 to 280	Rolled, Extruded or Forged	50	.002	.003	.004	.005	.008	.010	.012	.015	M10 M7 M1
MANGANESE CDC #770 CDC #772 CDC #780	140 to 220	Hot Rolled, Extruded or Forged	50	.0015	.003	.005	.007	.009	.012	.014	.016	M10 M7 M1
THERMOPLASTICS POLYETHYLENE POLYPROPYLENE TFE-FLUOROCARBON BUTYRATES	31R _R to 116R _R	Extruded, Molded or Cast	100	.005	.010	.012	.015	.018	.020	.025	.030	M10 M7 M1
HIGH-IMPACT STYRENE ACRYLONITRILE- BUTADIENE-STYRENE MODIFIED ACRYLIC	83R _R to 107R _R	Extruded, Molded or Cast	100	.002	.004	.005	.006	.006	.008	.008	.010	M10 M7 M1
NYLON ACETALS POLYCARBONATE	79R _M to 100R _M	Molded	100	.002	.005	.006	.008	.010	.012	.015	.015	M10 M7 M1
ACRYLICS	80R _M to 103R _M	Extruded, Molded or Cast	100	.002	.005	.006	.008	.010	.012	.015	.015	M10 M7 M1
POLYSTYRENES	70R _M to 95R _M	Molded or Extruded	200	.001	.002	.003	.004	.005	.006	.007	.008	M10 M7 M1
THERMOSETTING PLASTICS SOFT GRADES	50R _M to 93R _M	Cast, Molded or Filled	150	.003	.005	.006	.008	.010	.012	.015	.015	M10 M7 M1
HARD GRADES	100R _M to 119R _M	Cast, Molded or Filled	100	.002	.005	.006	.008	.010	.012	.015	.015	M10 M7 M1

*Special carbide composition for machining Uranium

INGALLS
Shipbuilding

WM - MANUAL

SECTION 5 LAYOUTS AND MATERIAL FLOW

CODE

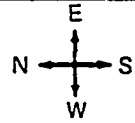
DATE 9-26-84

SIGN. TLC

PAGE 5-8

TOP VIEW OF ASSEMBLY 102

LEGEND



SCALE: 1" = 12.5'

SUBJECT: VANEAXIAL FAN
SEWAGE PUMP

BAY 1

VANEAXIAL
FAN
2ND PLATFORM

SEWAGE
PUMP
3RD PLATFORM

ACCESS
CUT
2ND PLATFORM

LADDER
2ND - 1ST
PLATFORM

ASSEMBLY
102

LADDER
2ND PLATFORM
TO GROUND

FR 146

FR 162

TRACK 2

BAY 2

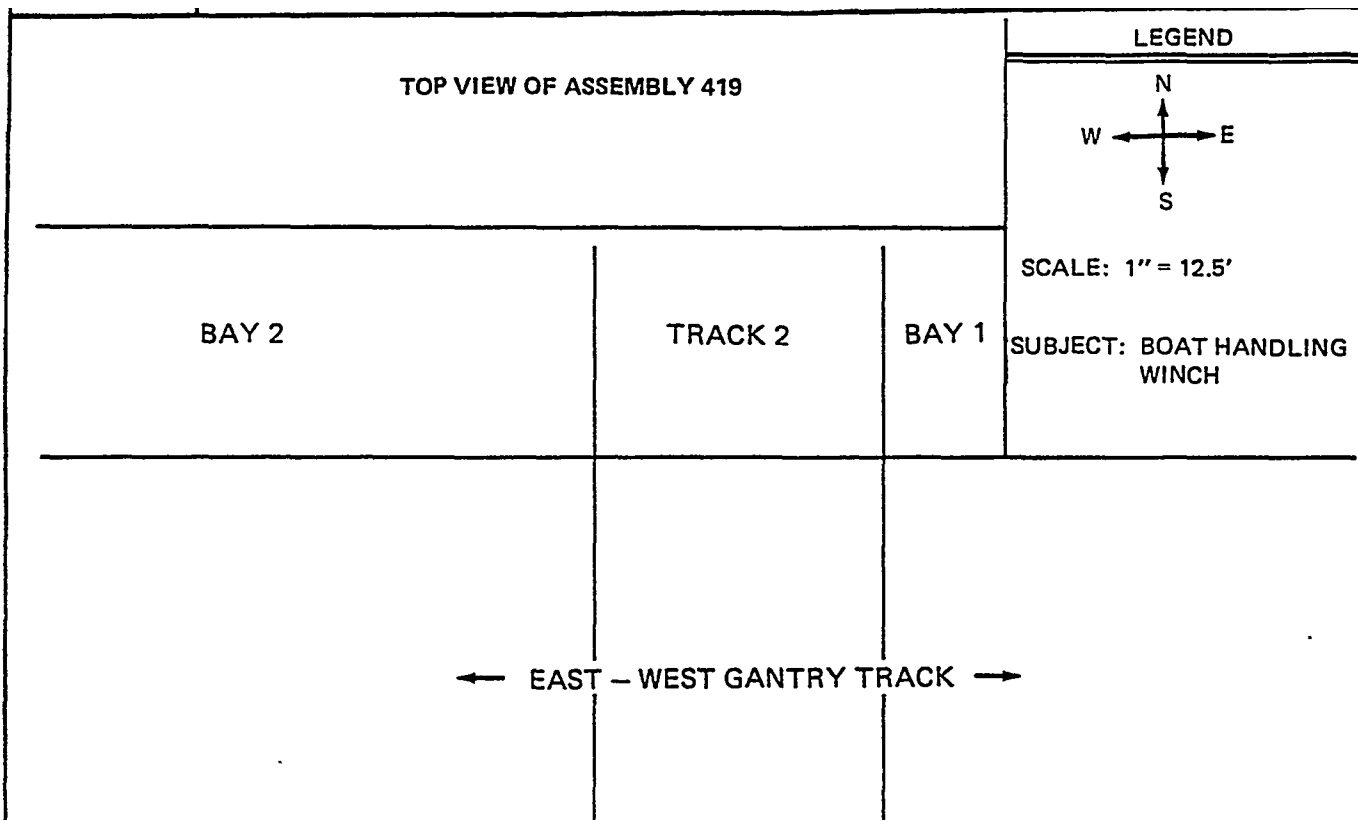
PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0001	303	158	190	190	190	211	285	304
0002	273	151	182	182	182	202	273	291
0003	390	202	242	242	242	269	364	422
0004	390	202	242	242	242	269	364	388
0005	390	202	242	242	242	269	364	422
0006	0	420	420	560	504	560	672	747
0007	0	682	910	910	1024	1213	1638	1986
0008	0	910	1213	1456	1560	1618	2185	2913
0009	341	173	208	208	208	231	312	333
0010	341	165	198	198	198	220	298	317
0011	455	242	364	416	437	485	582	647
0012	390	202	242	242	242	269	364	388
0013	420	227	273	303	341	420	455	496
0014	455	390	390	445	468	520	624	693
0015	0	546	546	728	655	728	874	971

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0016	420	227	341	273	341	420	455	496
0017	496	260	390	445	468	520	624	693
0018	0	496	662	662	662	794	851	993
0019	0	606	809	971	910	1079	1324	1494
0020	0	682	910	910	1024	1213	1638	1986
0021	0	910	1213	1456	1560	1618	2185	2913
0022	420	227	273	304	341	420	455	496
0023	364	242	364	416	437	485	582	647
0024	0	546	728	728	728	874	936	1092
0025	0	780	1040	1040	1170	1387	1872	2270
0026	0	1092	1456	1748	1872	1942	2622	3496
0027	0	5462	5462	5462	8193	7283	10925	10925
0028	390	202	242	242	242	269	364	388
0029	420	227	341	390	409	455	546	606
0030	0	455	455	606	546	606	728	809

PROCESS TIME FOR DRILLING ONE INCH DEPTH HOLES IN TMU'S



INGALLS
Shipbuilding

WM - MANUAL

SECTION 5 LAYOUTS AND MATERIAL FLOW

CODE

DATE 9-26-84

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PAGE 5-11

UNDERSIDE VIEW OF ASSEMBLY 303

LEGEND

W ← → E

SCALE 1" = 12.5'

SUBJECT: STERN TUBE

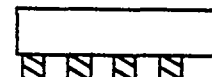
EAST - WEST GANTRY TRACK

INTEGRATION AREA (PORT SIDE)
(STERN)

LADDER
15 STEPS

SCAFFOLDING

LADDER
7 STEPS



PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0061	0	606	809	971	910	1079	1324	1494
0062	0	1820	1820	2427	3641	3641	4370	5826
0063	0	546	728	728	728	874	936	1092
0064	0	2731	2731	3641	5462	5462	6555	8740
0065	0	780	1040	1248	1337	1560	2081	2497
0066	0	910	1213	1456	1560	1820	2427	2913
0067	0	910	1213	1456	1560	1820	2427	2913
0068	0	682	910	1092	1024	1213	1489	1680
0069	0	910	1213	1456	1365	1456	1986	2241
0070	0	2731	2731	2731	3277	3641	4682	5462
0071	0	496	662	662	662	722	851	993
0072	0	606	809	971	910	971	1324	1494
0073	0	682	910	1092	1024	1213	1489	1680
0074	0	910	1213	1456	1365	1456	1986	2241
0075	0	780	1040	1248	1337	1560	2081	2497

INGALLS
Shipbuilding

WM - MANUAL

CODE

DATE 10/15/84

SIGN. TLC

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SECTION 6 - FACILITIES AND EQUIPMENT

INDEX

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C) Magnetic Base Drill Press	6-4
II. TOOLS	
A) Outside Machinist Personal Tool List	6-5
B) Tool Lists for Specific Jobs	6-6

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0106	0	93	112	140	168	186	240	298
0107	420	214	257	321	385	428	550	685
0108	0	101	121	151	182	202	260	323
0109	496	390	390	520	585	624	780	891
0110	0	170	170	227	256	273	341	390
0111	0	1213	809	971	1040	1079	1213	1618
0112	0	575	383	460	492	511	575	766
0113	341	182	218	273	327	364	468	582
0114	0	455	455	606	682	728	910	971
0115	0	606	809	809	910	971	1213	1618
0116	0	682	910	910	1024	1092	1365	1820
0117	0	2185	2185	2185	2622	2913	3745	4370
0118	0	227	227	260	273	303	364	404
0119	0	303	303	404	455	485	485	647
0120	0	364	364	485	546	582	582	776

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0121	0	341	341	455	512	546	546	728
0122	0	390	390	520	585	624	624	832
0123	273	130	156	156	167	173	234	249
0124	341	182	218	218	234	242	327	349
0125	390	202	242	242	260	269	364	388
0126	273	130	156	156	167	173	234	249
0127	273	140	168	168	180	186	252	268
0128	546	420	420	560	630	672	720	747
0129	0	1365	1365	1365	1365	1365	1820	2185
0130	0	455	606	606	682	728	780	809
0131	0	546	728	874	728	874	1008	1092
0132	0	606	809	971	910	882	1120	1213
0133	0	606	809	971	910	882	1120	1213
0134	496	260	390	520	585	624	668	693
0135	0	455	606	606	682	662	780	809

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0136	0	546	728	874	819	794	1008	1092
0137	0	1365	1365	1365	1365	1365	1820	2185
0138	0	546	728	874	819	794	1008	1092
0139	0	606	809	971	910	882	1120	1213
0140	0	1365	1365	1365	1365	1365	1820	2185
0141	0	682	910	1092	910	1092	1365	1680
0142	0	1560	1560	2081	1872	2081	2341	2774
0143	0	2185	2185	2913	3277	3496	4370	4994
0144	0	5462	5462	5462	8193	7283	10925	10925
0145	0	606	809	971	910	971	1213	1294
0146	0	1365	910	1092	1024	1365	1638	1820
0147	0	1820	1213	1820	2185	2081	2185	2427
0148	0	2731	2731	3641	4096	4370	5462	6242
0149	682	1092	546	364	468	546	655	672
0150	840	853	455	455	585	682	819	840

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0151	682	546	437	728	936	1092	1311	1344
0152	0	682	546	971	1170	1365	1638	1986
0153	0	910	728	1213	1560	1820	2427	2913
0154	0	1365	1092	1820	2341	2731	3641	4370
0155	0	1820	1820	2913	3641	4161	5462	6474
0156	0	2185	2185	2185	2622	2913	3745	4370
0157	0	2731	2731	3641	4096	5462	6555	8740
0158	0	7283	7283	9711	14566	14566	21850	19422
0159	0	2731	1820	2731	3277	3641	4682	5462
0160	0	7283	7283	9711	14566	14566	21850	19422
0161	496	390	312	520	585	693	936	1040
0162	0	546	437	728	819	971	1311	1456
0163	0	2731	5462	3641	3277	3121	3277	4370
0164	0	3641	7283	4855	3641	4161	4370	5826
0165	0	910	910	1213	1560	1456	1820	2427

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0166	0	2731	2731	3641	3277	3121	3277	4370
0167	0	5462	10925	10925	8193	7283	9364	10925
0168	0	1092	1092	1456	1872	1748	2185	2913
0169	0	3641	3641	4855	4370	4161	4370	5826
0170	0	5462	10925	10925	8193	7283	9364	10925
0171	0	1365	1365	1820	2341	2185	2731	3641
0172	0	1820	1820	2427	3121	2913	3641	4855
0173	0	546	546	624	728	874	1092	1456
0174	364	182	218	312	0	0	0	0
0175	546	243	291	416	0	0	0	0
0176	546	546	1092	1092	0	0	0	0
0177	0	420	560	560	630	448	560	672
0178	0	546	728	728	819	874	1092	1165
0179	0	1093	1456	1456	1638	1748	2185	2330
0180	0	5463	5462	7283	6555	6242	7283	7945

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0181	0	2731	5462	5462	5462	5462	8193	8740
0182	0	3642	7283	7283	7283	7283	10925	11653
0183	0	5463	10925	10925	10925	14566	16387	17480
0184	0	5463	10925	10925	10925	14566	16387	17480
0185	195	61	52	60	68	72	87	97
0186	195	72	62	73	82	87	104	116
0187	195	72	62	73	82	87	104	116
0188	195	72	62	73	82	87	104	116
0189	195	55	47	55	62	66	79	88
0190	195	60	52	61	68	72	87	97
0191	195	130	156	156	156	138	187	227
0192	195	130	137	137	137	121	163	198
0193	273	151	152	182	273	242	364	364
0194	227	130	130	156	234	208	312	312
0195	546	303	455	455	546	606	728	728

PROCESS TIME FOR DRILLING
ONE INCH DEPTH HOLES IN TMU'S

MAT'L & COND. CODE	1/16" DIA. HOLE	1/8" DIA. HOLE	1/4" DIA. HOLE	1/2" DIA. HOLE	3/4" DIA. HOLE	1" DIA. HOLE	1-1/2" DIA. HOLE	2" DIA. HOLE
0196	455	242	364	364	437	485	582	582
0197	61	61	69	80	91	107	145	155
0198	78	78	104	156	187	249	374	499
0199	273	364	546	874	819	874	1092	1165
0200	364	364	437	624	728	728	936	1092
0201	55	55	91	145	182	218	262	291
0202	137	137	218	364	546	546	819	874
0203	137	109	182	273	327	364	437	582
0204	137	109	182	273	327	364	437	582
0205	137	137	182	273	327	364	460	546
0206	61	73	121	182	218	242	291	388
0207	137	109	182	273	327	364	437	582
0208	364	312	291	437	524	582	874	1165
0209	30	26	24	364	43	48	72	97
....	0	0	0	0	0	0	0	0

INGALLS Shipbuilding	MOST - calculation		CODE	1004.14	
	DRILLING		DATE	2/6/84	
			SIGN.	TLC	
			PAGE	10-22	
ACTIVITY CHANGE DRILL BIT					
CONDITIONS ALL SHIPYARD AREAS					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	OPEN CHUCK (25 TURNS)	2	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₀		80
		7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀		40
2	PLACE DRILL BIT IN CHUCK		A B G A B P A		
			A B G A B P A		
3	CLOSE CHUCK (3 TURNS)		A B G A B P A		
			A B G A B P A		
4	TIGHTEN CHUCK (5 TAPS)		A B G A B P A		
			A B G A B P A		
5	LOOSEN CHUCK (5 TAPS)		A B G A B P A		
			A B G A B P A		
6	OPEN CHUCK (3 TURNS)		A B G A B P A		
			A B G A B P A		
7	PLACE DRILL BIT IN BAG		A B G A B P A		
			A B G A B P A		
8	CLOSE CHUCK (25 TURNS)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		1	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ (L ₅₄) A ₀ B ₀ P ₀ A ₀	(1.5)	950
		3	A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ F ₆ A ₀ B ₀ P ₀ A ₀		80
		4	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ F ₆ A ₁ B ₀ P ₁ A ₀		140
		5	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ F ₆ A ₁ B ₀ P ₁ A ₀		140
		6	A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ F ₆ A ₁ B ₀ P ₁ A ₀		100
		8	A ₁ B ₀ G ₃ A ₀ B ₀ P ₀ (F ₅₄) A ₁ B ₀ P ₁ A ₀	(1.5)	870
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				2400	

[illegible]

INGALLS Shipbuilding	MOST - calculation		1003.10		
			DATE 1/30/89		
			SIGN. TLC		
	LAYOUT FOR DRILLING		PAGE 10-16		
ACTIVITY WITHOUT TEMPLATE					
CONDITIONS ALL SHIPYARD AREAS					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET MARKER	1	A ₁ B ₀ G ₃ A ₁ B ₀ P ₀ A ₀		50
		2	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₀		80
2	REMOVE CAP FROM MARKER	7	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₀		80
		8	A ₀ B ₀ G ₀ A ₁ B ₀ P ₃ A ₀		40
3	MEASURE DIMENSIONS		A B G A B P A		
			A B G A B P A		
4	MAKE MARKS		A B G A B P A		
			A B G A B P A		
5	CENTER PUNCH HOLE		A B G A B P A		
			A B G A B P A		
6	CIRCLE HOLE WITH MARKER		A B G A B P A		
			A B G A B P A		
7	PUT CAP ON MARKER		A B G A B P A		
			A B G A B P A		
8	ASIDE MARKER		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		3	A ₁ B ₀ G ₃ A ₀ B ₀ (P ₁ A ₁ M ₃₂) A ₁ B ₀ P ₃ A ₀	(2)	760
		4	A ₀ B ₀ G ₀ A ₀ B ₀ (P ₁ A ₁ R ₃) A ₁ B ₀ P ₁ A ₀	(2)	120
		5	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ F ₆ A ₁ B ₀ P ₁ A ₀		160
		6	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ R ₆ A ₀ B ₀ P ₀ A ₀		100
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				1390	

INGALLS Shipbuilding	MOST - calculation		CODE 1001.231		
			DATE 1/13/84		
	JOB PREPARATION		SIGN. TLL		
			PAGE 10-14		
ACTIVITY SECURE DRAWINGS FROM REPRODUCTION SERVICES					
CONDITIONS ALL SHIPYARD AREAS					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	FILL OUT RSR FORM (1 WORD)	6	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ A ₀		30
			A B G A B P A		
2	FILL OUT RSR FORM (21 DIGITS)		A B G A B P A		
			A B G A B P A		
3	FILL OUT RSR FORM (1 SIGNATURE)		A B G A B P A		
			A B G A B P A		
4	FILL OUT RSR FORM (2 DATES)		A B G A B P A		
			A B G A B P A		
5	WAIT FOR DRAWING (3 MINS)		A B G A B P A		
			A B G A B P A		
6	RECEIVE DRAWING		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		1	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ R ₆ A ₁ B ₀ P ₀ A ₀		140
		2	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ R ₄₂ A ₀ B ₀ P ₀ A ₀		420
		3	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ R ₁₆ A ₀ B ₀ P ₀ A ₀		160
		4	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ R ₁₆ A ₀ B ₀ P ₀ A ₀	2	320
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		5			5000
TIME =					6070

INGALLS Shipbuilding	MOST - calculation		CODE <div style="border: 1px solid black; padding: 2px;">100218</div>		
			DATE <div style="border: 1px solid black; padding: 2px;">1/18/84</div>		
			SIGN. TLC		
	AREA TRAVEL		PAGE 10-15		
ACTIVITY TRAVEL FROM MODULE 2 STAIRS TO AMR #1					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	TRAVEL UP 24 STAIR STEPS	1	A ₄₂ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀		42
		2	A ₀ B ₄₂ G ₀ A ₀ B ₀ P ₀ A ₀		42
2	THROUGH MANHOLE	3	A ₃₂ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀		32
		6	A ₀ B ₄₂ G ₀ A ₀ B ₀ P ₀ A ₀		42
3	16 STEPS THRU ENGINE ROOM NO. 1	7	A ₄₂ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀		42
			A B G A B P A		
4	GET ON AND OFF LADDER		A B G A B P A		
			A B G A B P A		
5	UP LADDER 10 RUNGS		A B G A B P A		
			A B G A B P A		
6	THROUGH MANHOLE		A B G A B P A		
			A B G A B P A		
7	21 STEPS TO WORK AREA		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
		4	A ₀ B ₁₆ G ₀ M ₀ X ₀ I ₀ A ₀		16
		5	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀	10	50
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =					2660

FORM R-1-53

INGALLS Shipbuilding	MOST - calculation	CODE	1001.23
		DATE	1/13/84
		SIGN.	TLC
		PAGE	10-13
JOB PREPARATION			

ACTIVITY COMPLEX ADDITIONAL JOB PREPARATION

CONDITIONS ALL SHIP YARD AREAS

NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	AVERAGE ADDITIONAL JOB PREPARATION (CODE 1001.22)	5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	3	12
			A B G A B P A		
2	SECURE PARTS FROM WAREHOUSE (CODE 1001.132)		A B G A B P A		
			A B G A B P A		
3	SECURE DRAWINGS FROM REPRODUCTION SERVICES (CODE 1001.231)		A B G A B P A		
			A B G A B P A		
4	READ AN ADDITIONAL COMPLEX DRAWING		A B G A B P A		
			A B G A B P A		
5	TURN PAGES		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀ (1/10) A ₁ B ₀ P ₁ A ₀ (18.5)	18.5	189
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1			16597
		2			11445
		3			607

TIME =

53,152

INGALLS Shipbuilding	MOST = calculation		CODE 1001.1321		
			DATE 1/13/84		
	JOB PREPARATION		SIGN. TLC		
			PAGE 10-10		
ACTIVITY SECURE MATERIAL REQUISITION FORM FROM PRODUCTION CONTROL					
CONDITIONS ALL SHIPYARD AREAS					
NO.	METHOD	NO.	SEQUENCE MODEL	FM	TM
1	READ 9 WORDS FROM BILL	7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ A ₀		30
			A B G A B P A		
2	WRITE 15 WORDS ON REQUISITION		A B G A B P A		
			A B G A B P A		
3	WRITE 49 DIGITS ON REQUISITION		A B G A B P A		
			A B G A B P A		
4	WRITE 2 DATES ON REQUISITION		A B G A B P A		
			A B G A B P A		
5	WRITE 1 SIGNATURE		A B G A B P A		
			A B G A B P A		
6	READ 33 NOS FROM BILL		A B G A B P A		
			A B G A B P A		
7	CRAFT EMPLOYEE RECEIVES REQUISITION FROM PRODUCTION CONTROL EMPLOYEE		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		1	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ A ₀ (T ₁₀) A ₁ B ₀ P ₀ A ₀		150
		2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ A ₀ (R ₁₀) A ₁ B ₀ P ₀ A ₀ (2.1)		124
		3	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀ (R ₁₀) A ₀ B ₀ P ₀ A ₀ (1.7)		919
		4	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀ (R ₁₀) A ₀ B ₀ P ₀ A ₀ (1.1)		320
		5	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀ (R ₁₀) A ₀ B ₀ P ₀ A ₀		160
		6	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀ (T ₁₀) A ₀ B ₀ P ₀ A ₀ (2.5)		280
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =					3042

INGALLS Shipbuilding		MOST - calculation	1001.131	
			DATE	1/13/84
			SIGN.	TLC
		JOB PREPARATION	PAGE	10-3
ACTIVITY ADDITIONAL TIME FOR READING COMPLEX DRAWING				
CONDITIONS ALL SHIP YARD AREAS				
NO.	METHOD	NO.	SEQUENCE MODEL	EF. TMU
1	TURN PAGE (3PAGE DRAWING)	1	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	3 120
		4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	2 80
2	READ COMPLEX DRAWING (6,718,002) (2262 WORDS AND DIGITS)		A B G A B P A	
			A B G A B P A	
3	READ AVERAGE DRAWING		A B G A B P A	
			A B G A B P A	
4	TURN PAGE-AVERAGE DRAWING		A B G A B P A	
			A B G A B P A	
5	DIFFERENCE BETWEEN COMPLEX AND AVERAGE DRAWING READING		A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
		2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀ (1/10) A ₁ B ₀ P ₁ A ₀ (1/985)	18920
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀ (1/10) A ₁ B ₀ P ₁ A ₀ (1/1509)	15160
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
		5	[No.1] + [No.2] - [No.3 + (No.4)]	3780
TIME =		3780		

INGALLS Shipbuilding	MOST - calculation	CODE	1001.122		
		DATE	1/13/84		
		SIGN.	TLC		
		PAGE	10-6		
JOB PREPARATION					
ACTIVITY ADDITIONAL TIME FOR READING AVERAGE DRAWING					
CONDITIONS ALL SHIPYARD AREAS					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	READ AVERAGE DRAWING (1811 WORDS AND DIGITS) (GD 185286)	2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A	2	80
			A B G A B P A		
2	TURN PAGE		A B G A B P A		
			A B G A B P A		
3	READ SIMPLE DRAWING		A B G A B P A		
			A B G A B P A		
4	DIFFERENCE BETWEEN AVERAGE AND SIMPLE DRAWING READING		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		1	(A ₁ B ₀ G ₁ A ₁ B ₀ (T ₁₀)A ₁ B ₀ P ₃ A ₀)	(509)	1570
		3	(A ₁ B ₀ G ₁ A ₁ B ₀ (T ₁₀)A ₁ B ₀ P ₃ A ₀)	398	4050
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		4	(No.1) - (No.3)		1120
TIME =					11,200

INGALLS Shipbuilding	MOST - calculation					CODE	1001.11	
	JOB PREPARATION					DATE	1/13/84	
						SIGN.	TLC	
						PAGE	10-2	
ACTIVITY SIMPLE INITIAL JOB PREPARATION								
CONDITIONS ALL SHIP YARD AREAS								
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU			
1.	RECIEVE INSTRUCTIONS (3 MINS.)		A B G A B P A					
2.	READ BILL OF MATERIAL (2501-218-1) (210 WORDS AND DIGITS)		A B G A B P A					
3.	READ SIMPLE SKETCH (60185202) (478 WORDS AND DIGITS)		A B G A B P A					
4.	GET TOOLS FROM TOOL BOX (CODE 1001.111)		A B G A B P A					
5.	PUT TOOLS IN TOOL BOX (CODE 1001.111)		A B G A B P A					
6.	READ TIME CARD		A B G A B P A					
7.	SIGN TIME CARD		A B G A B P A					
			A B G A B P A					
			A B G A B P A					
			A B G A B P A					
			A B G A B P A					
			A B G M X I A					
			A B G M X I A					
			A B G M X I A					
			A B G M X I A					
			A B G M X I A					
			A B G M X I A					
			A B G M X I A					
			A B G M X I A					
			A B G M X I A					
		2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ (T ₁₀)A ₁ B ₀ P ₃ A ₀			(125)	1820	
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ (T ₁₀)A ₁ B ₀ P ₃ A ₀			(37.8)	4050	
		6	A ₁ B ₀ G ₁ A ₁ B ₀ P ₀ T ₃ A ₁ B ₀ P ₁ A				80	
		7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ R ₁₆ A ₁ B ₀ P ₁ A ₀				220	
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
			A B G A B P A B P A					
		1					5000	
		4					440	
		5					440	
TIME=						1 2 0 5 0		

FACE MILLING PROCESS TIME FORMULA DERIVATION

<u>OPERATION</u>	<u>FORMULA</u>	<u>SYMBOLS</u>
GIVEN : $t = L / f_m$	$t = L / f_{ro}$	Dm=Dia. of milling cutter (inches) fm= feed rate (in/min.) ft= feed rate (in/tooth)
SUBSTITUTE: $f_m = f_t \times T \times RPM$	$t = L / (f_t \times T \times RPM)$	K= Minute to TMU con- version factor (TMU~ per rein) L= Length of cut (inches) n= Number of cuts P= Process time (TMU's) RPM= Spindle Speed (rev/min.) t= Process time (min.) T= No. of teeth in milling cutter
SUBSTITUTE: RPM= $V_c / .262 D_m l$	$t = (.262 \times D_m \times L) / (f_t \times T \times V_c)$	
MULTIPLY: Include frequency factor (n)	$t = (.262 \times n \times D_m \times L) / (f_t \times T \times V_c)$	
SUBSTITUTE: $t = P / K$	$P = (.262 \times K \times n \times D_m \times L) / (f_t \times T \times V_c)$	
SUBSTITUTE: K = 1667	$P = (.262 \times 1667 \times n \times D_m \times L) / (f_t \times T \times V_c)$	
MULTIPLY: $1667 \times .262 = 437$	<u>$P = (437 \times n \times D_m \times L) / (f_t \times T \times V_c)$</u>	

"Machining Data Handbook," Metcut Research Associates Inc. (1966) p. 507.

INGALLS Shipbuilding	WM - MANUAL	CODE
		DATE 9/24/84
	SECTION 10 DATA SYNTHESIS AND BACK-UP	SIGN. TLC
		PAGE 10-1

This section contains all of the detailed MOST standard calculation forms which are the foundation for the unit and operation standards. The standards are listed in code number order. Below is an Index showing how this section is constructed .

INDEX

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SECTION 9 PROCESS DATA

MAIN ENGINE PADS FACE MILLING PROCESS TIME CALCULATIONS (CONTINUED)

MAIN ENGINE PADS MACHINING PHYSICAL CHARACTERISTICS:

WIDTH OF PADS (INCHES)		(L) LENGTH OF CUT* (INCHES)	
PAD #1 - 19 3/4	PAD#5 - 15	PAD #1 - 69.5	PAD #5--6125"5"
PAD #2 - 19 3/4	PAD #6 - 15	PAD #2 - 69.5	PAD #6 -75.0
PAD#3 - 15	PAD#7 - 15	PAD #3 -75.0	PAD #7 - 37.0
PAD #4 - 15	PAD #8 - 15	PAD #4 - 38.0	PAD #8 - 68.125

NO. OF ROUGH AND FINISH CUTS REQ'D		AVG. DEPTH OF MATERIAL REMOVED (INCHES)	
PAD #1 - 10R+3F	PAD #5 - 7R+2F	PAD #1 - .383	PAD #5 - .398
PAD #2 - 10R+3F	PAD #6 - 7R+2F	PAD #2 - .383	PAD #6 - .398
PAD #3 - 7R+2F	PAD #7 - 7R+2F	PAD #3 - .398	PAD #7 - .398
PAD #4 - 7R+2F	PAD #8 - 7R+2F	PAD #4 - .398	PAD #8 - .398
(Dm) DIAMETER OF CUTTER		(T) NO. OF TEETH IN CUTTER	
- 8.0 inches		- 16 teeth	

FACE MILLING FORMULA**:

$$P = (437 \times n \times Dm \times L) / (ft \times T \times Vc)$$

VARIABLES

Dm represents diameter of milling cutter in inches.
ft represents feed rate in inches/tooth
L represents length of cut in inches
n represents number of cuts
T represents number of teeth in cutter
Vc represents cutting speed in feet/rein.

*NOTE : Includes cutter overrun.

**See page 9-53 of this manual.

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		PAGE 9-52

MAIN ENGINE PADS
FACE MILLING PROCESS TIME CALCULATIONS
 (CONTINUED)

CALCULATIONS:

	ROUGH CUTS PADS #1-2
FORMULA	$P = (437 \times n \times D \times L) / (ft \times T \times Vc)$
SUBSTITUTION	$P = (437 \times 10 \times 8 \times 139) / (.014 \times 16 \times 530)$
PROCESS TIME	P = 40,932 TMU'S

	ROUGH CUTS PADS #3-8
FORMULA	$P = (437 \times n \times D \times L) / (ft \times T \times Vc)$
SUBSTITUTION	$P = (437 \times 7 \times 8 \times 361.25) / (.014 \times 16 \times 530)$
PROCESS TIME	P = 74,465 TMU'S

	FINISH CUTS PADS #1-2
FORMULA	$P = (437 \times n \times D \times L) / (ft \times T \times Vc)$
SUBSTITUTION	$P = (437 \times 3 \times 8 \times 139) / (.012 \times 16 \times 705)$
PROCESS TIME	P = 10,770 TMU'S

	FINISH CUTS PADS #3-8
FORMULA	$P = (437 \times n \times D \times L) / (ft \times T \times Vc)$
SUBSTITUTION	$P = (437 \times 2 \times 8 \times 361.25) / (.012 \times 16 \times 705)$
PROCESS TIME	P = 18,660 TMU'S

PROCESS TIME:

	<u>TOTAL ROUGH CUTS IN TMU'S</u>	<u>TOTAL FINISH CUTS IN TMU'S</u>	<u>TOTAL PROCESS TIME REQUIRED AT RECOMMENDED CONDITIONS IN TMU'S</u>
TOTAL FOR ONE ENGINE ROOM'S MAIN ENGINE PADS	115,397	29,430	144,827

SECTION 9 PROCESS DATA

FACING PROCESS TIME

FORMULA DERIVATION

OPERATION

FORMULA

SYMBOL

Given:
 $t = L/fm$

$$t = L/fm$$

Dt=Dia. of workpiece(inches)
fm=feed rate (in/min.)

Substitute:
 $fm = fr \times RPM^1$

$$t = L / (fr \times RPM)$$

fr=feed rate(in/rev.)
K=Minute to TMU conversion
factor (TMU's/Min.)
L=Length of cut (inches)
n=Number of cuts
P=Process time (TMU'S)
RPM=Spindle speed (rev./min)
t=Process time (minutes)
Vc=Cutting Speed (ft./min.)

Substitute:
 $RPM = Vc / .262 \text{ Dt}^1$

$$t = (.262 \times Dt \times L) / (fr \times Vc)$$

Multiply:
Include frequency
factor (n)

$$t = (.262 \times n \times Dt \times L) / (fr \times Vc)$$

Substitute:
 $t = P/K$

$$P = (.262 \times K \times n \times Dt \times L) / (fr \times Vc)$$

Substitute:
 $K = 1667$

$$P = (.262 \times 1667 \times n \times Dt \times L) / (fr \times Vc)$$

Multiply:
 $1667 \times .262 = 437$

$$\underline{\underline{P = (437 \times n \times Dt \times L) / (fr \times Vc)}}$$

1 "Machining Data Handbook", Metcut Research Associates Inc., (June 1966)
p. 507

SECTION 9 PROCESS DATA

MAIN ENGINE PADS

FACE MILLING PROCESS TIME CALCULATIONS

MATERIAL INFORMATION:

GIVEN

Description: - MIL-S-22698 Grade D class P
Type: - Plain Carbon Steel

EQUIVALENT

AISI NO. - 1018 Plain Carbon Steel
Carbon Content - .18%
Hardness - 128 BHN

RECOMMENDED SPEEDS AND FEEDS INFORMATION

TYPE CUT	DEPTH OF CUT	FEED (IPT) ft	SPEED (FPM) Vc	TOOLING	CUTTING FLUID
ROUGH CUT	.150	.014	530	C-6 Carbide	Shell Dromus Oil B (Light duty soluble oil)
FINISH CUT	.025	.012	705	c-7 Carbide	Shell Dromus Oil B (Light duty soluble oil)

⁵"Machining Data Handbook", Metcut Research Associates Inc., (June, 1966) p. 113.

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FIVE INCH GUN MOUNT

FACING PROCESS TIME CALCULATIONS (CONTINUED)

Five Inch Gun Mount Machining Physical Characteristics:

(L) Length of Cut (Inches)

Total - 7.75

Depth of Material. Removed (Inches)

Total - 0.50

(Dt) Work Piece Dimension (Inches)

Diameter - 95.9

Facing Formula.*

$$P = (437 \text{ xn} \times \text{Dt} \times \text{L}) / (\text{fr} \times \text{Vc})$$

VARIABLES

Dt represents diameter of workpiece
fr represents feedrate in inches per revolution.

L represents length of cut in inches
n represents number of cuts

P represents process time in tmu's.

Vc represents cutting speed in feet per minute.

*See page 9-49 of this manual..

FIVE INCH GUN MOUNT

FACING PROCESS TIME CALCULATIONS
(CONTINUED)

CALCULATIONS:

ROUGH CUTS (3)

FORMULA	$P = (437 \times n \times Dt \times L) / (fr \times Vc)$
SUBSTITUTION	$P = (437 \times 3 \times 95.9 \times 7.75) / (.015 \times 380)$
PROCESS TIME	$P = 170,942 \text{ TMU'S}$

FINISH CUTS (2)

FORMULA	$P = (437 \times n \times Dt \times L) / (fr \times Vc)$
SUBSTITUTION	$P = (437 \times 2 \times 95.9 \times 7.75) / (.007 \times 450)$
PROCESS TIME	$P = 206,215 \text{ TMU'S}$

PROCESS TIME:

	THREE ROUGH CUTS @ .150" DEPTH IN TMU ' S	TWO FINISH CUTS @ .025" DEPTHS IN Tmu ' s	TOTAL PROCESS TIME REQUIRED AT RECOMMENDED CONDITIONS IN TMU'S
Total. for One Five Inch Gun Mount	170,942	206,215	377,157

SECTION 9: PROCESS DATA

BORING PROCESS TIME FORMULA DERIVATION

OPERATION

FORMULA

SYMBOLS

Given
 $t = L/fm^1$

$$t = L/fm$$

D \bar{t} = Dia. of workpiece (in)
fm = feedrate (in/min.)
fr = feedrate (in/rev.)
K = Min to TMU conversion
factor (TMU's/MIN.)

Substitute:
 $fm = fr \times RPM^1$

$$t = L/(fr \times RPM)$$

L = Length of cut (inches)
n = Number of cuts
P = Process time (TMU's)
RPM = Spindle Speed (Rev./min.)
t = Process time (minutes)
Vc = Cutting Speed (ft./min.)

Substitute:
 $RPM = Vc/.262 \text{ Dt}^1$

$$t = (.262 \times Dt \times L) / (fr \times Vc)$$

Multiply:

$$t = (.262 \times n \times Dt \times L) / (fr \times Vc)$$

Include Frequency Factor
(n)

Substitute:
 $t = P/k$

$$P = (.262 \times K \times n \times Dt \times L) / (fr \times Vc)$$

Substitute:
K = 1667

$$P = (.262 \times 1667 \times n \times Dt \times L) / (fr \times Vc)$$

Multiply:
 $1667 \times .262 = 437$

$$\underline{\underline{P = (437 \times n \times Dt \times L) / (fr \times Vc)}}$$

¹"Machining Data Handbook," Metcut Research Associates Inc.
(June 1966) p. 507.

SECTION 9: PROCESS DATA

FIVE INCH GUN MOUNT
FACING PROCESS TIME CALCULATIONSMATERIAL INFORMATION:

GIVEN

Description - MIL-S-24113A Grade N Class U
Type - Plain Carbon Steel

EQUIVALENT

AISI NO - 1018 Plain Carbon Steel
Carbon Content - 0.18%
Hardness - 161 BHNRECOMMENDED SPEEDS FEEDS INFORMATION:⁴

TYPE CUT	DEPTH OF CUT (In Inches)	FEED (IPR) fr	SPEED (FPM) Vc	TOOLING	CUTTING FLUID
ROUGH CUT	.150	.015	380	C-6 Car- bide	Shell Dromus Oil B (Light Duty soluble Oil)
FINISH CUT	.025	.007	450	C-7 Car- " bide	Shell Dromus Oil B (Light Duty Soluble Oil)

⁴"Machining Data Handbook", Metcut Research Associates Inc.,
(June 1966) P.4.

STERN TUBE BORING PROCESS TIME CALCULATIONS (CONTINUED)

STERN TUBE PHYSICAL CHARACTERISTICS:

DEPTH OF MATERIAL REMOVED

ALL LANDS - 0.50 INCHES

(L) LENGTH OF CUT (INCHES)

First Land* - 4.50

Second Land - 3.75

Third Land - 3.75

Fourth Land - 4.75

(Dt) WORK PIECE DIAMETER

- 52 INCHES

Total 16.75

BORING FORMULA**

$$P = (437 \times n \times Dt \times L) / (fr \times Vc)$$

VARIABLES

Dt represents dia. of workpiece in inches

fr represents feedrate in in./rev.

L represents length of cut in inches

n represents number of cuts

P represents process time in tmu's

Vc represents cutting speed in feet/rein.

*A land is a surface upon which supports the main shaft bearing.

** See page 9-45 of this manual.

SECTION 9: PROCESS DATA

STERN TUBE BORING PROCESS TIME CALCULATION (CONTINUED)

CALCULATIONS:

ROUGH CUTS

FORMULA	$P = (437 \times n \times D \times L) / (f \times V_c)$
SUBSTITUTION	$P = (437 \times 4 \times 52 \times 16.75) / (0.012 \times 295)$
PROCESS TIME	$P = 430,088 \text{ TMU'S}$

FINISH CUTS

FORMULA	$P = (437 \times n \times D \times L) / (f \times V_c)$
SUBSTITUTION	$P = (437 \times 2 \times 52 \times 16.75) / (.009 \times 310)$
PROCESS TIME	$P = 272,851 \text{ TMU'S}$

PROCESS TIME:

	Four Rough cuts @ .10" <u>Depth in TMU's</u>	Two Finish Cuts @ .05" Depth <u>In TMU's</u>	Total Process Time Required At Recom- mended Conditions <u>in TMU'S</u>
Total for one Stern Tube	430,088	272,851	702,939

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SECTION 9: PROCESS DATA

```

WIN702,84.024,07:49:59,WIN702.TOMMY.FORT
00000100 C
00000200 C THIS PROGRAM WILL CALCULATE PROCESS TIMES FOR DRILLING ONE INCH
00000300 C DEPTH IN T.M.U.'S
00000400 REAL DD,FR,VC,TIME
00000500 INTEGER COUNT
00000600 10 READ(1,20) COUNT,DD,FR,VC
00000700 20 FORMAT(11,1X,F6.4,1X,F5.4,1X,F5.1)
00000800 30 IF(COUNT.EQ.0) GO TO 80
00000900 40 TIME = (437.0*DD)/(FR*VC)
00001000 50 WRITE(2,60) DD,FR,VC,TIME
00001100 60 FORMAT(F6.4,1X,F5.4,1X,F5.1,1X,F10.1)
00001200 70 GO TO 10
00001300 80 STOP
00001400 END

```

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	SECTION 9: PROCESS DATA	SIGN. TLC
		PAGE 9 - 4 2

STERN TUBE
BORING PROCESS TIME CALCULATIONS

MATERIAL INFORMATION:

GIVEN

DESCRIPTION	- MIL-S-23008B or 15083B
TYPE	- STEEL CASTING

EQUIVALENT

AISI NO.	- 1320 Cast Steel, Low Alloy
Carbon Content	- 0.20%
Hardness	- 190 BHN

RECOMMENDED SPEEDS AND FEEDS INFORMATION

TYPE CUT	DEPTH OF CUT (INCHES)	FEED (IPR) fr	SPEED (FPM) Vc	TOOLING	CUTTING FLUID
ROUGH CUT	0.100	0.012	295	C-7 CARBIDE	Shell Dromus Oil E (Chemical Coolant Type)
FINISH CUT	0.050	0.009	310	C-7 CARBIDE	Shell Dromus Oil E (Chemical Coolant Type)

³"Machining Data Handbook", Metcut Research Associates Inc.,
(June 1966) p.55.

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		PAGE 9-39

DRILLING PROCESS TIME

FORMULA DERIVATION

<u>OPERATION</u>	<u>FORMULA</u>	<u>SYMBOLS</u>
Given $T = L/fm^1$	$T = L/fm$	Dd = Dia. of drill (in.) fm = feedrate (in./min.) fr = feedrate (in/rev.)
Substitute $fm = fr \times RPM^1$	$T = L/(fr \times RPM)$	K = Minute to TMU conversion factor (TMU/min.)
Substitute: $RPM = Vc/.262 Dd^1$	$T = (.262 \times Dd \times L)/(fr \times Vc)$	L = Length of cut (in.) P = Process time (TMU's) RPM = Spindle speed (rev/min.)
Substitute: $L = 1$	$T = (.262 \times Dd \times 1)/(fr \times Vc)$	T = Process time (min.) Vc = Cutting Speed (ft./Min)
Substitute: $T = P/K$	$P = (.262 \times K \times Dd)/(fr \times Vc)$	
Substitute: $K = 1667$	$P = (.262 \times 1667 \times Dd)/(fr \times Vc)$	
Multiply: $1667 \times .262 = 437$	<u><u>$P = (437 \times Dd)/(fr \times Vc)$</u></u>	

¹"Machining Data Handbook", Metcut Research Associates Inc.
(June 1966) p. 507

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	SECTION 9: PROCESS DATA	SIGN. TLC
		PAGE 9-40

DRILLING PROCESS TIME COMPUTER PROGRAM

The process time values contained in the process time charts (pages 9-25 through 9-38) were derived using a computer program to calculate the time values in TMU's. The recommended speeds and feeds for the various materials were taken from the Machining Data Handbook.² The computer program (on page 9-41) then calculated process time values for the charts. The process time values were transferred as data into the ADRS (A Departmental Reporting System by IBM) Graphics Computer Program. The process time charts were then produced from the ADRS Graphics Computer Program.

²"Machining Data Handbook," Metcut Research Associates Inc., (June 1966) p. 221-240.

[illegible]

INGALLS Shipbuilding		MOST - calculation		CODE 2003.064	
		STERN TUBE BORING		DATE 6/29/84	
				SIGN. TIA	
				PAGE 10-78	
ACTIVITY REMOVE AFT SUPPORT					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET TORCH LINES, REPLACE	1	A3 B0 G1 A3 B0 P3 A3		130
		3	A1 B0 G1 A1 B0 P3 A1	5	350
2	CONNECT & DISCONNECT LINES	4	A1 B0 G3 A1 B0 P1 A0		60
		6	A1 B0 G1 A1 B0 P3 A0		60
3	PLACE GLOVES, REMOVE GLOVES & GOGGLES	11	A0 B0 G0 A1 B0 P3 A0	3	120
		12	A0 B0 G0 A1 B0 P1 A0		20
4	PLACE GOGGLES	14	A3 B16 G3 A0 B0 P0 A0		220
		15	A2 B16 G3 A0 B0 P0 A0		220
5	OPEN & CLOSE VALVES	19	A3 B0 G0 A0 B0 P0 A3		60
		22	A B G A B P A		0
6	GET & RETURN STRIKER		A B G A B P A		
			A B G A B P A		
7	LIGHT TORCH		A B G A B P A		
			A B G A B P A		
8	ADJUST FLAME		A B G A B P A		
			A B G A B P A		
9	LOWER GOGGLES		A B G A B P A		
			A B G A B P A		
10	RAISE GOGGLES	5	A1 B0 G1 M1 X0 I0 A0	(2)2	120
		7	A1 B0 G0 M1 X0 I0 A0		20
11	POSITION TORCH	8	A1 B0 G1 M1 X0 I0 A0		30
		9	A1 B0 G1 M1 X0 I1 A0	3	120
12	ASIDE TORCH	10	A1 B0 G1 M1 X0 I0 A0	3	90
	3 @ .2125 MIN/INCH	13	A3 B16 G1 M1 (X33) I0 A0	(12)3	12450
13	BURN-TOP & BOTTOM FIXTURES		A B G M X I A		
			A B G M X I A		
14	CLIMB ON TOP FIXTURE	2	A0 B0 G0 A0 P1 A1 F3 A1 B0 P1 A1	(2)2	2300
			A B G A B P A R P A		
15	CLIMB OFF TOP FIXTURE		A B G A B P A B P A		
			A B G A B P A B P A		
16	SET-UP TO UNBOLT CODE 1005.02		A B G A B P A B P A		
			A B G A B P A B P A		
17	UNBOLT (CODE 1005.04 - 3/4" BOLT)		A B G A B P A B P A		
			A B G A B P A B P A		
18	REMOVE BOLT (CODE 1005.03)		A B G A B P A B P A		
			A B G A B P A B P A		
19	WALK TO & FROM BOTTOM FIXTURE		A B G A B P A B P A		
			A B G A B P A B P A		
20	UNBOLT (CODE 1005.04) - 3/4" BOLT	16			970
		17		2	1476
21	REMOVE BOLT (CODE 1005.03)	18		2	820
		20		4	3352
22	RIGGERS REMOVE AFT SUPPORT	21		4	1640
TIME =					24,528

INGALLS Shipbuilding	MOST - calculation		CODE	2003.01
			DATE	6/29/84
	STERN TUBE BORING		SIGN.	TLC
			PAGE	10-79
ACTIVITY	REMOVE FORWARD SUPPORT & BORING BAR			
CONDITIONS	INTEGRATION AREA			
NO.	METHOD	NO.	SEQUENCE MODEL	FR
1	GET TORCH LINES, REPLACE	1	A3 B2432G0 A2432B0 P0 A3	
		3	A1 B0 G1 A1 B0 P3 A1	5
2	CONNECT & DISCONNECT LINES	4	A1 B0 G3 A1 B0 P1 A0	
		6	A1 B0 G1 A1 B0 P3 A0	
3	PLACE GLOVES, REMOVE GLOVES & GOGGLES	11	A0 B0 G0 A1 B0 P3 A0	4
		12	A0 B0 G0 A1 B0 P1 A0	
4	PLACE GOGGLES	17	A B G A B P A	
			A B G A B P A	
5	OPEN & CLOSE VALVES		A B G A B P A	
			A B G A B P A	
6	GET & RETURN STRIKER		A B G A B P A	
			A B G A B P A	
7	LIGHT TORCH		A B G A B P A	
			A B G A B P A	
8	ADJUST FLAME		A B G A B P A	
			A B G A B P A	
9	LOWER GOGGLES		A B G A B P A	
			A B G A B P A	
10	RAISE GOGGLES	5	A1 B0 G1 M1 X0 I0 A0	(2)2
		7	A1 B0 G0 M1 X0 I0 A0	
11	POSITION TORCH	8	A1 B0 G1 M1 X0 I0 A0	
		9	A1 B0 G1 M1 X0 I1 A0	4
12	ASIDE TORCH	10	A1 B0 G1 M1 X0 I0 A0	4
		13	A1 B0 G1 M1 X1 I0 A0	4
13	BURN 1/2" TACK @ 4 PLACES @ 2.125 MIN/IN		A B G M X I A	
			A B G M X I A	
14	SET-UP TO UNBOLT (CODE 1005.02)	2	A0 B0 G0 A0 B0 (A1 F54) A1 B0 P1 A1	(2)2
			A B G A B P A B P A	
15	UNBOLT SPYDER (CODE 1005.04) - 3/4" BOLT		A B G A B P A B P A	
			A B G A B P A B P A	
16	REMOVE BOLTS (CODE 1005.03)		A B G A B P A B P A	
			A B G A B P A B P A	
17	RIGGERS REMOVE SPYDER & BORING BAR		A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
		14		970
		15		838 4
		16		410 4
TIME =				11,

INGALLS Shipbuilding	MOST - calculation	CODE	2003.062		
		DATE	6/29/84		
		SIGN.	TLC		
		PAGE	10-76		
STERN TUBE BORING					
ACTIVITY REMOVE FEED MECHANISM					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SAME AS INSTALLATION CODE 2003.035		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1			24,579
TIME =					24,579

INGALLS Shipbuilding	MOST - calculation		CODE	2003.06:	
			DATE	6/29/84	
			SIGN.	TLC	
			PAGE	10-77	
STERN TUBE BORING					
ACTIVITY REMOVE BORING BAR DRIVE PULLEY					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	
1	SET-UP TO UNBOLT (CODE 1005.01)	5	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀		
		6	A ₃ B ₀ G ₀ A ₃ B ₀ P ₀ A ₃		
2	TURN BOLT (CODE 1005.06)-3/8" BOLTS		A B G A B P A		
			A B G A B P A		
3	REMOVE BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
4	REMOVE PALLEY (65 STRIKES)		A B G A B P A		
			A B G A B P A		
5	GET AND ASIDE KEYWAY		A B G A B P A		
			A B G A B P A		
6	TRAVEL TO SHAFT & RETURN TO BENCH		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ (L ₅₄)A ₁ B ₀ P ₃ A ₀	(2.41)	11
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
		1		860	
		2		953	4 3
		3		410	4 1
TIME =				790	

[illegible]

INGALLS Shipbuilding	<h1 style="text-align: center;">MOST - calculation</h1>	CODE	2003.0	
		DATE	6/29/84	
		SIGN.	TLC	
		PAGE	10-75	
STERN TUBE BORING				
ACTIVITY REMOVE ELECTRIC MOTOR				
CONDITIONS INTEGRATION AREA				
NO.	METHOD	NO.	SEQUENCE MODEL	FR
1	GET TORCH LINES, REPLACE	1	A3 B0 G1 A3 B0 P3 A3	
2	CONNECT & DISCONNECT LINES	3	A1 B0 G1 A1 B0 P3 A1	5
		4	A1 B0 G3 A1 B0 P1 A0	
3	PLACE GLOVES, REMOVE GLOVES & GOGGLES	6	A1 B0 G1 A1 B0 P3 A0	
		11	A0 B0 G0 A1 B0 P3 A0	5
4	PLACE GOGGLES	12	A0 B0 G0 A1 B0 P1 A0	
		14	A1 B0 G3 A3 B0 P1 A3	
5	OPEN & CLOSE VALVES	16	A3 B0 G3 A3 B0 P1 A3	
		17	A B G A B P A	
6	GET & RETURN STRIKER		A B G A B P A	
			A B G A B P A	
7	LIGHT TORCH		A B G A B P A	
			A B G A B P A	
8	ADJUST FLAME		A B G A B P A	
			A B G A B P A	
9	LOWER GOGGLES		A B G A B P A	
			A B G A B P A	
10	RAISE GOGGLES	5	A1 B0 G1 M1 X0 I0 A0	(2) 2
		7	A1 B0 G0 M1 X0 I0 A0	
11	POSITION TORCH	8	A1 B0 G1 M1 X0 I0 A0	
		9	A1 B0 G1 M1 X0 I1 A0	5
12	ASIDE TORCH (.2125 HRS/INCH)	10	A1 B0 G1 M1 X0 I0 A0	5
		13	A1 B0 G1 M1 X32 I0 A1	5
13	BURN BRACES & SUPPORT PLATES	15	A1 B0 G1 M1 X10 I0 A1	8
			A B G M X I A	
14	REMOVE PULLEY GUARD	2	A0 B0 G0 A0 B0 (A1 F34) A1 B0 P1 A1	(2) 2
			A B G A B P A R P A	
15	REMOVE NAILS (8 NAILS)		A B G A B P A B P A	
			A B G A B P A B P A	
16	REMOVE PULLEY BELT		A B G A B P A B P A	
			A B G A B P A B P A	
17	RIGGERS REMOVE MOTOR		A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
TIME =		68		

[illegible]

INGALLS Shipbuilding		MOST - calculation		CODE 2003.054	
		STERN TUBE BORING		DATE 6/29/84	
				SIGN. TLC	
				PAGE 10-68	
ACTIVITY FEED TOOL TO AND FROM LAND SURFACES					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	WALK TO BORING BAR	1	A ₃ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀	5	150
		5	A ₁ B ₀ G ₃ A ₁ B ₆ P ₁ A ₀	2x5	1200
2	SET-UP TO UN-BOLT CODE 1005.01		A B G A B P A		
			A B G A B P A		
3	TURN BOLT (1/2" BOLTS) CODE 1005.06		A B G A B P A		
			A B G A B P A		
4	REMOVE BOLT & REPLACE BOLT CODE 1005.03		A B G A B P A		
			A B G A B P A		
5	REMOVE GEAR & REPLACE GEAR		A B G A B P A		
			A B G A B P A		
6	SLIDE #2 GEAR IN POSITION		A B G A B P A		
			A B G A B P A		
7	LOCK GEAR IN POSITION		A B G A B P A		
			A B G A B P A		
8	FEED TOOL TO LAND #1		A B G A B P A		
			A B G A B P A		
9	FEED FROM LAND 1 TO LAND 2		A B G A B P A		
			A B G A B P A		
10	FEED FROM LAND 2 TO LAND 3	6	A ₁ B ₀ G ₃ M ₃ X ₀ I ₀ A ₀	2x5	700
		7	A ₀ B ₀ G ₀ M ₁ X ₀ I ₀ A ₀	2x5	100
11	FEED FROM LAND 3 TO LAND 4		A B G M X I A		
			A B G M X I A		
12	FEED FROM LAND 4 TO LAND 1		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		8	A ₃ B ₀ G ₁ A ₃ B ₀ P ₃ (F ₅₄)A ₁ B ₀ P ₀ A ₃	(2.2)	1328
		9	A ₃ B ₀ G ₁ A ₃ B ₀ P ₃ (F ₅₄)A ₁ B ₀ P ₀ A ₃	(2.2)	7968
		10	A ₃ B ₀ G ₁ A ₃ B ₀ P ₃ (F ₅₄)A ₁ B ₀ P ₀ A ₃	(2.2)	7968
		11	A ₃ B ₀ G ₁ A ₃ B ₀ P ₃ (F ₅₄)A ₁ B ₀ P ₀ A ₃	(2.2)	7968
		12	A ₃ B ₀ G ₁ A ₃ B ₀ P ₃ (F ₅₄)A ₁ B ₀ P ₀ A ₃	(2.2)	34,536
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		2		860	5
		3		953	5x2
		4		410	5x2
TIME =				79,848	

[illegible]

[illegible]

INGALLS Shipbuilding	WM - MANUAL	CODE
		2003.05
	STERN TUBE BORING	SIGN. TLC
		PAGE 10-64

PREPARE MACHINE AFTER EACH CUT

SUB-OPERATION SUMMARY

<u>CODE</u>	<u>DESCRIPTION</u>	<u>TOTAL TMU'S</u>
2003.051	Burn Off Target Markers	29,120
2003.052	Remove Chips	31,440
2003.053	Grind Rough Edges on Stern Tube	93,200
2003.054	Feed Tool to and from Land Surface	79,848
2003.055	Measure and Evaluate ID-Finish Cut	130,260
2003.056	Use Feeler Gages to Determine Next Depth of Cut-Finish Cut Only	3,840
2003.057	Change Tool	26,222
2003.058	Adjust Tool Cut (Depth)	84,624
2003.059	Sharpen Tools	59,180
		<u>537,734</u>

INGALLS Shipbuilding	MOST - calculation		CODE	2003.05
			DATE	6/29/84
			SIGN.	TLC
	STERN TUBE BORING		PAGE	10-65
ACTIVITY BURN OFF TARGET MARKERS				
CONDITIONS INTEGRATION AREA				
NO.	METHOD	NO.	SEQUENCE MODEL	FR
1	PLACE GLOVES, REMOVE GLOVES AND GOGGLES	1	(A, B, G, A, B, P, A)	(5) 4
		2	A, B, G, A, B, P, A	4
2	PLACE GOGGLES	4	A, B, G, A, B, P, A	4
		9	A, B, G, A, B, P, A	16
3	OPEN AND CLOSE VALVES	10	A, B, G, A, B, P, A	16
			A, B, G, A, B, P, A	
4	GET AND RETURN STRIKER		A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
5	LIGHT TORCH		A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
6	ADJUST FLAME		A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
7	LOWER GOGGLES		A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
8	RAISE GOGGLES		A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
9	POSITION TORCH		A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
10	ASIDE TORCH	3	A, B, G, M, X, I, A	(4) 4
		5	A, B, G, M, X, I, A	4
11	CLIMB INTO STERN TUBE CASTING	6	(A, B, G, M, X, I, A)	(2) 4
		7	A, B, G, M, X, I, A	16
12	BURN TARGETS (1" SQUARE) (.85 MIN/TARGET)	8	A, B, G, M, X, I, A	16
		11	(A, B, G, M, X, I, A)	(4) 2
		12	A, B, G, M, X, I, A	16
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
			A, B, G, A, B, P, A	
TIME =				29,

INGALLS Shipbuilding	MOST - calculation		CODE		
			2003.037		
	STEERN TUBE BORING		DATE 6/29/84		
			SIGN. TLC		
		PAGE 10-62			
ACTIVITY MEASURE ID AND ADJUST BORING BAR TO OPTICAL CENTER					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	OPEN MICROMETER CASE	3	(A, B ₀ G ₁) A ₃ B ₀ P ₁ A ₀	(2)	80
		10	(A, B ₀ G ₁) A ₃ B ₀ P ₁ A ₀	(2)	80
2	ASSEMBLE MICROMETER		A B G A B P A		
			A B G A B P A		
3	GET WRENCH AND ALIGNMENT ENGINEERS DIMENSION PAPER FROM BENCH		A B G A B P A		
			A B G A B P A		
4	MEASURE ID WITH MICROMETER (MEASURE 4" RADII (4 TIMES) X 55 MM. SIZE 19 mm.)		A B G A B P A		
			A B G A B P A		
5	READ ALIGNMENT ENGINEERS DIMENSIONS		A B G A B P A		
			A B G A B P A		
6	RECORD MICROMETER DIMENSIONS		A B G A B P A		
			A B G A B P A		
7	RECORD ALIGNMENT ENGINEERS DIMENSIONS		A B G A B P A		
			A B G A B P A		
8	CALCULATE DIFFERENCE BETWEEN ENGINEERS AND ACTUAL DIMENSIONS		A B G A B P A		
			A B G A B P A		
9	ADJUST SET SCREWS ON BORING BAR		A B G A B P A		
			A B G A B P A		
10	TAKE WRENCH, ALIGN ENG. DIM. PAPER AND MIC. TO BENCH	1	A, B ₀ G ₁ M ₃ X ₀ I ₀ A ₀		50
		8	A ₀ B ₀ G ₀ M ₀ X ₃₂ I ₀ A ₀	76	24320
11	DISASSEMBLE MICROMETER & PLACE IN CASE	12	A, B ₀ G ₁ M ₃ X ₀ I ₀ A ₀		50
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		2	A, B ₀ G ₁ A ₃ B ₀ P ₁ F ₁₀ A ₀ B ₀ P ₁ A ₀	2	360
		4	A, B ₀ G ₁ A ₃ B ₀ P ₁ (M ₅₄) A ₁ B ₀ P ₁ A ₀	(5.5)/6	235,600
		5	A, B ₀ G ₁ A ₁ B ₀ P ₀ T ₁₀ A ₁ B ₀ P ₁ A ₀	76	11,400
		6	A, B ₀ G ₁ A ₁ B ₀ P ₁ R ₆ A ₁ B ₀ P ₁ A ₀	76	12,160
		7	A, B ₀ G ₁ A ₁ B ₀ P ₁ R ₆ A ₀ B ₀ P ₁ A ₀	76	5320
		9	A, B ₀ G ₁ A ₁ B ₀ P ₁ F ₁₆ A ₁ B ₀ P ₁ A ₀	76	18240
		11	A, B ₀ G ₁ A ₀ B ₀ P ₀ F ₁₀ A ₁ B ₀ P ₁ A ₀	2	360
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME				308,020	

INGALLS Shipbuilding	MOST - calculation		CODE 2003.04		
			DATE 6/29/84		
	STERN TUBE BORING		SIGN. TLC		
			PAGE 10-63		
ACTIVITY OPERATE BORING BAR					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	*TMU
1	TURN BORING BAR MOTOR ON AND OFF	5	A B G A B P A		-0-
			A B G A B P A		
2	BORING PROCESS TIME (SEE PAGE 9-44)		A B G A B P A		
			A B G A B P A		
3	REMOVE AND REPLACE OIL CAP		A B G A B P A		
			A B G A B P A		
4	INSPECT OIL LEVEL		A B G A B P A		
			A B G A B P A		
5	FILL OIL RESERVOIR		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
		1	A ₃ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	48	2400
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	2	400
		4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ T ₁ A ₁ B ₀ P ₁ A ₀		70
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
		2		702,931	702,931
TIME =					705,809

INGALLS Shipbuilding	MOST - calculation		CODE 2003.035			
			DATE 6/29/84			
	STERN TUBE BORING		SIGN. TLC			
			PAGE 10-60			
ACTIVITY INSTALL FEED CONTROL MECHANISM						
CONDITIONS INTEGRATION AREA						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	GET GEAR HOUSING, BOLTS, AND WRENCH AND PLACE NEAR STERN TUBE	1	(A ₁ B ₀ G ₃) A ₃ B ₆ P ₁ A ₀	(3)	220	
		2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀		60	
2	PLACE GEAR HOUSING ON BORING BAR	3	A ₀ B ₆ G ₀ A ₀ B ₀ P ₀ A ₀	6	360	
		6	A ₃ B ₀ (G ₃) A ₃ B ₆ P ₁ A ₀	(4)	250	
3	BEND AND ARISE	7	A ₁ B ₀ G ₁ A ₁ B ₆ P ₆ A ₁	3	480	
		10	A ₃ B ₀ (G ₃) A ₃ B ₆ P ₁ A ₀	(3)	220	
4	POSITION BOLTS (CODE 1005.03)	11	A ₁ B ₆ G ₁ A ₁ B ₀ P ₃ A ₀	2	240	
		15	A ₁ B ₆ G ₁ A ₁ B ₀ P ₃ A ₀	2	240	
5	BOLT-UP - 1/2" BOLTS (CODE 1005.06)	18	A ₁ B ₀ G ₃ A ₃ B ₀ P ₁ A ₀		80	
			A B G A B P A			
6	GET GEARS AND BOLTS AND PLACE NEAR BORING BAR		A B G A B P A			
			A B G A B P A			
7	PLACE GEARS IN POSITION IN GEAR HOUSING		A B G A B P A			
			A B G A B P A			
8	POSITION BOLTS		A B G A B P A			
			A B G A B P A			
9	BOLT-UP - 1/2" BOLTS (CODE 1005.06)		A B G A B P A			
			A B G A B P A			
10	GET GEARWORM PLATES, HAMMER, AND BOLTS PLACE ITEMS NEAR BORING BAR		A B G M X I A			
			A B G M X I A			
11	PLACE PLATES IN POSITION ON BORING BAR		A B G M X I A			
			A B G M X I A			
12	FIT PLATES IN POSITION - TAP 25 TIMES WITH HAMMER		A B G M X I A			
			A B G M X I A			
13	POSITION BOLTS		A B G M X I A			
			A B G M X I A			
14	BOLT-UP - 1" BOLTS (CODE 1005.04)	12	A ₁ B ₆ G ₁ A ₁ B ₀ P ₁ F ₃₂ A ₁ B ₆ P ₁ A ₀	2	1000	
			A B G A B P A B P A			
15	INSTALL EXTERNAL PLATES		A B G A B P A B P A			
			A B G A B P A B P A			
16	POSITION BOLTS		A B G A B P A B P A			
			A B G A B P A B P A			
17	BOLT-UP - 1" BOLTS (CODE 1005.04)		A B G A B P A B P A			
			A B G A B P A B P A			
18	RETURN TOOLS TO BENCH		A B G A B P A B P A			
			A B G A B P A B P A			
		4		410	6	2460
		5		953	6	5718
		8		410	3	1230
		9		953	3	2859
		13		410	2	820
		14		1117	2	2234
		16		410	4	1640
		17		1117	4	4468
TIME =					24,579	

INGALLS Shipbuilding		MOST - calculation		CODE 2003.036	
		STERN TUBE BORING		DATE 6/29/84	
				SIGN. TLC	
				PAGE 10 - 31	
ACTIVITY INSTALL ELECTRIC MOTOR					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TML
1	RIGGER PLACE MOTOR IN POSITION	1	A B G A B P A		-0-
		2	A ₁ B ₀ G ₁ A ₃ B ₆ P ₂ A ₅		145
2	PLACE BELT ON BORING BAR PULLEY	3	A ₁ B ₀ G ₃ A ₃ B ₆ P ₃ A ₃		19
		6	A ₁ B ₀ G ₁ A ₃ B ₀ P ₃ A ₃		110
3	PLACE BELT ON MOTOR'S PULLEY	7	A ₀ B ₀ G ₀ A ₃ B ₀ P ₃ A ₁	5	355
			A B G A B P A		
4	NAIL MOTOR DOWN - 8 NAILS @ 1" L		A B G A B P A		
			A B G A B P A		
5	NAIL BRACES DOWN - 4 NAILS @ 1" L		A B G A B P A		
			A B G A B P A		
6	INSTALL GUARD ON PULLEY		A B G A B P A		
			A B G A B P A		
7	PLACE WELDING ROD TO WORK		A B G A B P A		
			A B G A B P A		
8	OPEN AND CLOSE SHIELD		A B G A B P A		
			A B G A B P A		
9	WELD BRACES AND SUPPORT PLATES 3" TACK WELD @ 5 PLACES @ (.14 MIN/INCH)		A B G A B P A		
			A B G A B P A		
10	PLUG IN MOTOR & UNPLUG MOTOR (CODE 1004.13)	8	A ₁ B ₀ G ₁ M ₁ X ₂ L ₀ A ₀	10	30
		9	A ₁ B ₀ G ₁ M ₁ X ₆ L ₀ A ₁	5	3550
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		4	A ₁ B ₀ G ₃ A ₃ B ₆ (P ₁ A ₁ F ₂) A ₃ B ₀ P ₁ A ₀	(8)	360
		5	A ₃ B ₀ G ₃ A ₃ B ₀ (P ₁ A ₁ F ₂) A ₃ B ₀ P ₁ A ₀	(4)	180
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		10		2960	296
TIME =				13,180	

INGALLS Shipbuilding	MOST - calculation		CODE 2003.033		
			DATE 6/29/84		
	STERN TUBE BORING		SIGN. TLC		
			PAGE 10-58		
ACTIVITY INSTALL AFT. BORING BAR SUPPORT					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	RIGGERS POSITION BOTTOM & TOP FIXTURES & GEARBOX.	1	A B G A B P A		-0-
		2	A ₃ B ₁₆ G ₃ A ₃ B ₁₆ P ₁ A ₃		450
2	MACHINISTS GET ON AND OFF TOP FIXTURE.	6	A ₀ B ₆ G ₀ A ₀ B ₀ P ₀ A ₀		60
		9	A B G A B P A		-0-
3	SET-UP TO BOLT-UP TOP FIXTURE TO GEARBOX (CODE 1005.02)	13	A ₃ B ₁₆ G ₃ A ₃ B ₁₆ P ₁ A ₃		450
		15	A ₀ B ₀ G ₀ A ₁ B ₀ P ₀ A ₁	6	300
4	POSITION BOLT IN TOP FIXTURE (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
5	BOLT-UP TOP FIXTURE TO GEARBOX (CODE 1005.04) - 3/4" BOLT		A B G A B P A		
			A B G A B P A		
6	MOVE INTO POSITION FOR BOTTOM FIXTURE		A B G A B P A		
			A B G A B P A		
7	POSITION BOLT IN BOTTOM FIXTURE (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
8	BOLT-UP BOTTOM FIXTURE TO GEARBOX (CODE 1005.04) - 3/4" BOLT		A B G A B P A		
			A B G A B P A		
9	RIGGER POSITIONS GEARBOX AND FIXTURE ASSEMBLY TO STERN TUBE		A B G A B P A		
			A B G A B P A		
10	TACK WELD TOP FIXTURE TO STERN TUBE 1 tack weld @ 1" (.14 min/inch @ 5/16" fillet weld)	10	A ₃ (B ₁₆) G ₁ M ₁ X ₂₄ I ₀ A ₃	(2)	640
		11	(A ₃ B ₀ G ₁ M ₁ X ₂₄ I ₀) A ₃	(2)	610
11	TACK WELD BOTTOM FIXTURE TO STERN TUBE 2 tack welds @ 1" (.14 min/inch @ 5/16" fillet weld)	12	(A ₃ B ₀ G ₁ M ₁ X ₂₇₀ I ₀) A ₃	(2)	5530
		14	A ₃ B ₀ G ₁ M ₁ X ₂₇₀ I ₀ A ₃		2780
12	WELD BOTTOM FIXTURE COMPLETE 2 @ 1" (.14 min/inch @ 5/16" fillet weld)	16	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	12	360
			A B G M X I A		
13	WELDER GET ON AND OFF TOP FIXTURE		A B G M X I A		
			A B G M X I A		
14	WELD TOP FIXTURE COMPLETE 1 @ 1" (.14 min/inch @ 5/16" fillet weld)		A B G A B P A B P A		
			A B G A B P A B P A		
15	PLACE WELDING ROD TO WORK		A B G A B P A B P A		
			A B G A B P A B P A		
16	OPEN AND CLOSE SHIELD - WELDER		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3		970	970
		4		410	2 820
		5		838	2 1676
		7		410	4 1640
		8		838	4 3352
TIME =					19,638

INGALLS Shipbuilding	MOST - calculation	CODE	2003.034
		DATE	6/29/84
	STERN TUBE BORING	SIGN.	TLC
		PAGE	10-59

ACTIVITY INSTALL BORING BAR DRIVE PULLEY

CONDITIONS INTEGRATION AREA

NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMI
1	GET KEYWAY, PULLEY, HAMMER, AND FILE. PLACE ITEMS DOWN NEAR SHAFT	1	(A ₁ B ₀ G ₃) A ₃ B ₆ P ₁ A ₀	(4)	260
		4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀		60
2	FILE KEY WAY (80 TIMES)	6	A ₃ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀		6
		11	A ₁ B ₀ G ₃ A ₃ B ₀ P ₀ A ₀		70
3	TAP KEYWAY (40 TIMES) TO PULLEY		A B G A B P A		
			A B G A B P A		
4	PLACE PULLEY AND KEYWAY ASSEMBLY TO SHAFT		A B G A B P A		
			A B G A B P A		
5	STRIKE PULLEY ONTO SHAFT (65 STRIKES)		A B G A B P A		
			A B G A B P A		
6	WALK TO BENCH AND RETURN		A B G A B P A		
			A B G A B P A		
7	SET-UP TO BOLT-UP (CODE 1005.01)		A B G A B P A		
			A B G A B P A		
8	POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
9	BOLT-UP BOLT (CODE 1005.06)-3/8" BOLT		A B G A B P A		
			A B G A B P A		
10	ROTATE PULLEY (20 TIMES) (ARM REPOSITION STROKES)		A B G M X I A		
		2	A ₁ B ₀ G ₁ (M ₁) X ₀ I ₀ A ₀	(80)	820
11	RETURN TOOLS TO BENCH		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ F ₅₄ A ₁ B ₀ P ₁ A ₀		600
		5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ (F ₅₄) A ₁ B ₀ P ₁ A ₀	(2.4)	136
		10	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ F ₃ A ₁ B ₀ P ₁ A ₀	20	1600
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		7		860	860
		8		410	4 1640
		9		953	4 3812

TIME =

11,143

INGALLS Shipbuilding	MOST - calculation		CODE 2003.031		
			DATE 6/29/84		
	STERN TUBE BORING		SIGN. TLC		
			PAGE 10-56		
ACTIVITY INSTALL BORING BAR					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	RIGGERS PLACE FORWARD SUPPORT IN STERN TUBE	1	A B G A B P A		-0-
		2	A B G A B P A		-0-
2	RIGGERS INSERT BORING BAR INTO STERN TUBE	7	A B G A B P A		-0-
			A B G A B P A		
3	SET-UP TO UNBOLT FORWARD SUPPORT BOLTS (CODE 1005.01)		A B G A B P A		
			A B G A B P A		
4	UN-BOLT FORWARD SUPPORT BOLTS (CODE 1005.06) 314"		A B G A B P A		
			A B G A B P A		
5	REMOVE FORWARD SUPPORT BOLTS (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
6	MACHINIST GETS INTO AND OUT OF STERN TUBE		A B G A B P A		
			A B G A B P A		
7	RIGGER SLIDES BORING BAR INTO FORWARD SUPPORT		A B G A B P A		
			A B G A B P A		
8	POSITION BOLT TO BOLT-UP FORWARD SUPPORT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
9	BOLT-UP FORWARD SUPPORT BOLTS (CODE 1005.06)		A B G A B P A		
			A B G A B P A		
		6	A ₃ B ₂₄₇₂ G ₀ M ₀ X ₀ I ₀ A ₀	2	1180
			A ₀ B ₀ G ₀ M ₀ X ₀ I ₀ A ₀		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3	860		860
		4	1429	4	5716
		5	410	4	1640
		8	410	4	1640
		9	1429	4	5716
TIME =					16,752

INGALLS
Shipbuilding

WM - MANUAL

STERN TUBE BORING

CODE

2003.03

DATE 6/29/84

SIGN. TLC

PAGE 10-55

INSTALL BORING EQUIPMENT SUB-OPERATION SUMMARY

<u>CODE</u>	<u>DESCRIPTION</u>	<u>TOTAL TMU'S</u>
2003.031	Install Boring Bar	16,752
2003.032	Final Positioning of Forward Boring Bar Support	4,200
2003.033	Install Aft. Boring Bar Support	19,638
2003.034	Install Boring Bar Drive Pulley	11,143
2003.035	Install Feed Control Mechanism	24,579
2003.036	Install Electric Motor	13,180
2003.037	Measure ID and adjust Boring Bar to Optical Center	308,020
		<hr/> 397,512

INGALLS Shipbuilding	MOST - calculation		CODE 2002.14		
			DATE 8-6-84		
			SIGN. FWM		
	MAIN ENGINE PADSFACE MILLING		PAGE 10-51		
ACTIVITY REMOVE MACHINE & SUPPORT FRAME					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
		1	(A ₃ B ₆ G ₃ A ₁₆ B ₀ P ₆ A ₁₆)	(2)2	2000
1	GET TORCH LINES OR REPLACE	3	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁)	(5)8	2800
		4	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	8	480
2	CONNECT OR DISCONNECT LINES	6	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	8	480
		11	A ₀ B ₀ G ₀ A ₁ B ₀ P ₃ A ₀	8	320
3	PLACE GLOVES, REMOVE GLOVES OR GOGGLES	12	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ A ₀	8	160
4	PLACE GOGGLES		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
5	OPEN & CLOSE VALVES		A B G A B P A		
			A B G A B P A		
6	GET & RETURN STRIKER		A B G A B P A		
			A B G A B P A		
7	LIGHT TORCH		A B G A B P A		
			A B G A B P A		
8	ADJUST FLAME		A B G A B P A		
			A B G A B P A		
9	LOWER GOGGLES		A B G A B P A		
		5	(A ₁ B ₀ G ₁ M ₁) X ₀ I ₀ A ₀	(2)16	960
10	RAISE GOGGLES	7	A ₁ B ₀ G ₀ M ₁ X ₀ I ₀ A ₀	8	160
		8	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	8	240
11	POSITION TORCH	9	A ₁ B ₀ G ₁ M ₁ X ₀ I ₁ A ₀	8	320
		10	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	8	240
12	ASIDE TORCH		A B G M X I A		
			A B G M X I A		
13	BURN ALL TACK WELDS		A B G M X I A		
		2	A ₀ B ₀ G ₀ A ₀ B ₀ (P ₁ A ₁ F ₃₄) A ₁ B ₀ P ₁ A ₁	(2)4	4600
	LOOSE		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		13	810	212	171,720
TIME =					184,480

INGALLS Shipbuilding		MOST - calculation		CODE 2002.11	
		MAIN ENGINE PADS FACE MILLING		DATE 8-6-84	
				SIGN. FWM	
				PAGE 10-45	
ACTIVITY OPERATE MILLING MACHINE					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	ENGAGE SPINDLE, SET FEEDS, STOP	8	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀)	(2) 8	640
			A B G A B P A		
			A B G A B P A		
2	FEED HEAD ACROSS		A B G A B P A		
			A B G A B P A		
3	FEED HEAD ALONG		A B G A B P A		
			A B G A B P A		
4	ADJUST HEAD EACH CUT		A B G A B P A		
			A B G A B P A		
5	ADJUST HEAD EACH ROUGH PASS		A B G A B P A		
			A B G A B P A		
6	ADJUST HEAD EACH FINISH PASS		A B G A B P A		
			A B G A B P A		
7	TOTAL PROCESS TIME		A B G A B P A		
			A B G A B P A		
	ALL PADS		A B G A B P A		
			A B G A B P A		
8	GET SPRAY CAN		A B G A B P A		
			A B G A B P A		
9	SHAKE CAN	1	(A ₁ B ₀ G ₁ M ₁) X ₀ I ₀ A ₀	(6) 80	14,400
		2	A ₁ B ₀ G ₁ M ₁ X ₃₂ I ₀ A ₀	80	28,000
		3	A ₁ B ₀ G ₁ M ₁ X ₂₄ I ₀ A ₀	80	21,600
10	SPRAY ROUGH CUT LINES	9	A ₀ B ₀ G ₀ M ₀ (X ₁₇₃) I ₀ A ₀	(2) 8	27,680
		10	A ₁ B ₀ G ₁ M ₁ X ₁₃₁ I ₀ A ₀	8	10,720
11	SPRAY PAD AFTER MACHINING	11	A ₁ B ₀ G ₁ M ₁ X ₃₃₆ I ₀ A ₀	8	26,640
			A B G M X I A		
			A B G M X I A		
		4	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ F ₅₄ A ₀ B ₀ P ₀ A ₀	18	10,080
		5	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ F ₁₆ A ₀ B ₀ P ₀ A ₀	44	7,920
		6	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ F ₆ A ₀ B ₀ P ₀ A ₀	18	1,440
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		7		144,827	144,827
TIME =				293,947	

INGALLS Shipbuilding	MOST - calculation		CODE 2002.12		
			DATE 8-6-84		
			SIGN. FWM		
	MAIN ENGINE PADS FACE MILLING		PAGE 10-49		
ACTIVITY WELD SUPPORT FRAME IN PLACE					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
		1	A B G A B P A		0
1	GET FRAMEWORK PIECES LANDED	4	(A ₆ B ₆ G ₃ A ₁ B ₀ P ₁ A ₀)	(3)2	1020
	ON SHIP	5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	2	120
		6	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁)	(2)2	280
		7	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀)	(2)2	160
2	MEASURE FOR POSITION	8	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀)	(16)2	1920
		9	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀)	(16)2	1920
3	MARK MEASUREMENT	14	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀)	(3)2	240
		15	A ₁ B ₀ G ₃ A ₆ B ₆ P ₁ A ₀	2	340
4	GET WELDING EQUIPMENT & PIECES		A B G A B P A		
			A B G A B P A		
5	PLACE SHIELD		A B G A B P A		
			A B G A B P A		
6	PLACE GLOVES		A B G A B P A		
			A B G A B P A		
7	GET OR ASIDE WHIP		A B G A B P A		
			A B G A B P A		
8	INSERT WELDING ROD		A B G A B P A		
		10	(A ₁ B ₀ G ₁ M ₁) X ₀ I ₀ A ₀	(32)2	1920
9	PLACE PIECE	11	(A ₃ B ₀ G ₁ M ₀ X ₃₃₀) I ₀ A ₀	(8)2	53440
		12	(A ₃ B ₆ G ₁ M ₀ X ₃₃₀) I ₀ A ₀	(8)2	54400
10	CLOSE OR OPEN SHIELD	13	A ₀ B ₀ (G ₁ M ₁) X ₀ I ₀ A ₀	(16)2	640
			A B G M X I A		
11	TACK WELD CHANNEL TO FDN		A B G M X I A		
			A B G M X I A		
12	TACK WELD ANGLE TO CHANNEL		A B G M X I A		
		2	A ₁ B ₀ G ₁ A ₃ B ₀ (P ₁ A ₁ M ₃₂) A ₁ B ₀ P ₁ A ₀	(8)2	5580
	& DECK	3	A ₁ B ₀ G ₁ A ₃ B ₀ (P ₁ A ₁ R ₃) A ₁ B ₀ P ₁ A ₀	(16)2	1740
			A B G A B P A B P A		
13	RELEASE SPENT RODS		A B G A B P A B P A		
			A B G A B P A B P A		
14	REMOVE SHIELD & GLOVES		A B G A B P A B P A		
			A B G A B P A B P A		
15	RETURN WELDING EQUIPMENT		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =					123,720

INGALLS Shipbuilding		MOST - calculation		CODE	
				2002. 09	
				DATE	8-6-84
				SIGN.	FWM
		MAIN ENGINE PADS FACE MILLING		PAGE	10-46
ACTIVITY INSTALL & CHANGE CUTTING TOOLS					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
	INSTALL-REMOVE CUTTING TOOLS	1	A ₁ B ₀ G ₃ A ₆ B ₃ P ₁ A ₀	4	560
		3	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₀	4	320
		6	A ₁ B ₀ G ₃ A ₁ B ₀ P ₆ A ₁	16	1920
1	COLLECT TOOLS	7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	16	960
		8	A ₁ B ₀ G ₃ A ₆ B ₃ P ₁ A ₀	2	280
2	LOOSEN OR TIGHTEN COVER WING NUTS	10	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₀	2	160
			A B G A B P A		
3	REMOVE OR REPLACE COVER		A B G A B P A		
			A B G A B P A		
4	HAND TURN PULLEY TO ROTATE HEAD		A B G A B P A		
			A B G A B P A		
5	LOOSEN OR TIGHTEN SET SCREWS		A B G A B P A		
			A B G A B P A		
6	INSTALL TOOL INSERT		A B G A B P A		
			A B G A B P A		
7	REMOVE TOOL INSERT		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
	ROTATE TOOLS		A B G M X I A		
			A B G M X I A		
8	COLLECT TOOLS		A B G M X I A		
			A B G M X I A		
9	LOOSEN OR TIGHTEN COVER WING NUTS		A B G M X I A		
			A B G M X I A		
10	REMOVE OR REPLACE COVER		A B G M X I A		
			A B G M X I A		
		2	(A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ F ₆) A ₀ B ₀ P ₀ A ₀	(2)4	640
11	HAND TURN PULLEY TO ROTATE HEAD	4	(A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ F ₁₀) A ₀ B ₀ P ₀ A ₀	(8)2	1920
		5	A ₁ B ₀ G ₁ A ₀ B ₀ P ₃ A ₁ F ₆ A ₁ B ₀ P ₁ A ₀	(16)2	3280
12	MARK FIRST TOOL WITH CHALK	9	(A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ F ₆) A ₀ B ₀ P ₀ A ₀	(2)2	320
		11	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ F ₁₀ A ₀ B ₀ P ₀ A ₀	8	960
13	LOOSEN OR TIGHTEN SET SCREWS	12	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ R ₁ A ₁ B ₀ P ₁ A ₀		90
		13	A ₁ B ₀ G ₁ A ₀ B ₀ P ₃ A ₁ F ₆ A ₁ B ₀ P ₁ A ₀	32	4480
14	REMOVE TOOL INSERT & INSPECT	14	A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ T ₃ A ₀ B ₀ P ₀ A ₀	16	800
15	CLEAN & REPLACE TOOL INSERT	15	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ S ₃ A ₁ B ₀ P ₆ A ₀	16	1600
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				18290	

FORM R-1458

INGALLS Shipbuilding	MOST - calculation		CODE		
			2002.03		
	MAIN ENGINE PADS FACE MILLING		DATE	8-6-84	
			SIGN.	FWM	
		PAGE	10-40		
ACTIVITY ALIGN PADS ON FOUNDATION					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	WAIT FOR PADS TO LAND ON SHIP	1	A B G A B P A		0
		2	A B G A B P A		0
2	WAIT FOR ALIGN ENGR TO SHOOT	3	A ₁ B ₀ G ₃ A ₆ B ₀ P ₁ A ₀	8	880
		8	A ₁ B ₀ G ₁ A ₁ B ₀ P ₆ A ₀	8	720
	LINES.	11	(A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀)	(2)8	960
		12	A ₀ B ₀ G ₀ A ₁ B ₆ P ₆ A ₀	8	1040
3	COLLECT TOOLS & ASIDE		A B G A B P A		
			A B G A B P A		
4	WIPE OFF FDN		A B G A B P A		
			A B G A B P A		
5	MEASURE FROM ALIGN MARKS		A B G A B P A		
			A B G A B P A		
6	MARK MEASUREMENTS		A B G A B P A		
			A B G A B P A		
7	PULL OUT CHALKLINE		A B G A B P A		
			A B G A B P A		
8	PLACE CHALKLINE		A B G A B P A		
			A B G A B P A		
9	SNAP CHALKLINE	7	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀	8	400
		9	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	8	240
10	REWIND CHALKLINE	10	A ₁ B ₀ G ₁ M ₅ X ₀ I ₀ A ₀	8	4480
		15	A ₃ B ₆ G ₃ M ₆ X ₀ I ₀ A ₀	8	1440
11	GET & RETURN HAMMER & PUNCH	17	A ₃ B ₆ G ₃ M ₆ X ₀ I ₀ A ₀	8	1440
			A B G M X I A		
12	PLACE PUNCH ON MARKS		A B G M X I A		
			A B G M X I A		
13	CENTER PUNCH MARKS	4	A ₁ B ₀ G ₁ A ₆ B ₆ P ₁ S ₄ Z ₂ A ₁ B ₀ P ₁ A ₀	8	4720
		5	A ₁ B ₀ G ₁ A ₀ B ₆ P ₁ A ₆ M ₃ A ₁ B ₀ P ₁ A ₀	(2)8	7520
14	INSPECT MARKS	6	A ₁ B ₀ G ₁ A ₀ B ₆ P ₁ A ₆ R ₁ A ₁ B ₀ P ₁ A ₀	(2)8	2560
		13	A ₀ B ₀ G ₀ A ₀ B ₆ P ₁ A ₁ F ₆ A ₀ B ₀ P ₀ A ₀	(7)8	4480
15	STAND PAD ON EDGE & MOVE	14	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ (T ₁) A ₀ B ₀ P ₀ A ₀	(7)8	560
		16	A ₁ B ₀ G ₁ A ₆ B ₆ P ₁ S ₄ Z ₂ A ₁ B ₀ P ₁ A ₀	8	4720
16	WIPE FDN	18	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ F ₁₀ A ₁ B ₀ P ₁ A ₀	8	1440
			A B G A B P A B P A		
17	LAY PAD DOWN & SLIDE		A B G A B P A B P A		
			A B G A B P A B P A		
18	TAP PAD WITH HAMMER TO		A B G A B P A B P A		
			A B G A B P A B P A		
	ALIGN		A B G A B P A B P A		
TIME =					37,600

FORM R-1458

INGALLS Shipbuilding	MOST - calculation					CODE <div style="text-align: right;">2002.02</div>
	MAIN ENGINE PADS FACE MILLING					DATE <div style="text-align: right;">8-6-84</div>
						SIGN. <div style="text-align: right;">FWM</div>
						PAGE <div style="text-align: right;">10-39</div>
ACTIVITY <div style="text-align: center;">AREA TRAVEL</div>						
CONDITIONS <div style="text-align: center;">MODULE AREA</div>						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	FROM TOOL BOX TO MODULE 2 STAIRS OR RETURN (CODE 1002.12)		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
2	FROM TOOL BOX TO TOOL ROOM OR RETURN (CODE 1002.16)		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
3	FROM MODULE 2 STAIRS TO E.R. #1 OR RETURN (47 STEPS)		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
4	TRAVEL IN E.R. #1, TO EACH FDN (24 STEPS)		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
		1	3300	4	13,200	
		2	11311	2	22,622	
		3	810	4	3,240	
		4	420	4	1,680	
TIME =					40,742	

FORM R-1458

INGALLS Shipbuilding	MOST - calculation		CODE 2001.10		
			DATE 5/2/84		
	FIVE INCH GUN MOUNT FACING		SIGN. FWM		
			PAGE 10-37		
ACTIVITY REMOVE MACHINE FROM DECK & REMOVE STRIKER BY BURNING					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET TORCH LINES, REPLACE	1	A ₃ B ₆ G ₃ A ₃₂ B ₀ P ₆ A ₃₂	2	1640
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁	5	35
2	CONNECT & DISCONNECT LINES	4	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀		60
		6	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀		60
3	PLACES GLOVES, REMOVE GLOVES & GOGGLES	11	A ₀ B ₀ G ₀ A ₁ B ₀ P ₃ A ₀		40
		12	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ A ₀		20
4	PLACE GOGGLES	14	A B G A B P A		0
			A B G A B P A		
5	OPEN & CLOSE VALVES		A B G A B P A		
			A B G A B P A		
6	GET & RETURN STRIKER		A B G A B P A		
			A B G A B P A		
7	LIGHT TORCH		A B G A B P A		
			A B G A B P A		
8	ADJUST FLAME		A B G A B P A		
			A B G A B P A		
9	LOWER GOGGLES		A B G A B P A		
			A B G A B P A		
10	RAISE GOGGLES	5	(A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀)	(2)2	120
		7	A ₁ B ₀ G ₀ M ₁ X ₀ I ₀ A ₀		20
11	POSITION TORCH	8	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀		30
		9	A ₁ B ₀ G ₁ M ₁ X ₀ I ₁ A ₀	5	200
12	ASIDE TORCH	10	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	5	150
			A B G M X I A		
13	BURN		A B G M X I A		
			A B G M X I A		
14	RIGGER GET MACHINE OFF BOARD	2	A ₀ B ₀ G ₀ B ₀ (A ₁ F ₁) A ₁ B ₀ P ₁ A ₁	(2)2	2300
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		13			10,592
TIME =					15,582

INGALLS Shipbuilding		MOST - calculation		CODE 2001.08	
		FIVE INCH GUN MOUNT FACING		DATE 5/2/84	
				SIGN. FWM	
				PAGE 10-35	
ACTIVITY OPERATE MACHINE					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TML
1	HAND CRANK HEAD TO START POSITION	2	A ₁ B ₀ G ₃ A ₁ B ₀ P ₆ A ₁	5	600
		5	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₀	5	400
		10	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₁	5	450
			A B G A B P A		
			A B G A B P A		
2	PLACE TOOL		A B G A B P A		
			A B G A B P A		
3	TIGHTEN OR LOOSEN HOLDING SCREW		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
4	TURN POWER ON OR OFF		A B G A B P A		
			A B G A B P A		
5	GET $\frac{1}{2}$ ASIDE CONTROLLER		A B G A B P A		
			A B G A B P A		
6	PUSH CONTROLLER BUTTON		A B G A B P A		
			A B G A B P A		
7	MACHINE FOUNDATION		A B G A B P A		
			A B G A B P A		
8	ADJUST TOOL HEIGHT	4	(A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀)	(2)5	50
		6	(A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀)	(2)5	300
		8	A ₀ B ₀ G ₀ M ₃ X ₀ I ₀ A ₁	5	200
9	LOOSEN THEN TIGHTEN SCREW		A B G M X I A		
			A B G M X I A		
10	REMOVE TOOL		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		1	A ₀ B ₀ G ₀ A ₁ B ₁ P ₁ F ₁₀ A ₀ B ₀ P ₀ A ₀	5	6650
		3	A ₁ B ₀ G ₃ A ₁ B ₁ P ₃ A ₁ F ₁₀ A ₁ B ₀ P ₁ A ₀	2	54
		9	A ₁ B ₀ G ₃ A ₀ B ₁ P ₃ A ₁ F ₁₀ A ₁ B ₀ P ₁ A ₀	(2)4	1600
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		7	MACHINING PROCESS TIME		377.7
			(5 PASSES AT RECOMMENDED FEEDS & SPEEDS)		
TIME =				388,397.	

INGALLS Shipbuilding	MOST - calculation		CODE 2001.05		
			DATE 5/2/84		
	FIVE INCH GUN MOUNT FACING		SIGN. FWM		
			PAGE 10-32		
ACTIVITY LEVEL MACHINE					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	LOOSEN ALL 8 LEVELER HOLD	3	A ₁ B ₀ G ₃ A ₁ B ₀ P ₆ A ₁	2	240
	DOWN BOLTS.	7	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	4	240
		9	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	3	120
			A B G A B P A		
			A B G A B P A		
2	ROUGHLY ADJUST ALL 4		A B G A B P A		
	LEVELING SCREWS.		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
3	PLACE POINTER TOOL & REMOVE		A B G A B P A		
4	TIGHTEN SET SCREW & LOOSEN		A B G A B P A		
5	CRANK HEAD INTO POSITION.		A B G A B P A		
6	ROTATE TO EACH ALIGN MARK		A B G A B P A		
7	GET & ASIDE RULE		A B G A B P A		
			A B G A B P A		
8	MEASURE AT EACH ALIGN MARK	6	A ₁ B ₀ G ₁ M ₃ X ₁₀ I ₀ A ₀	16	2400
			A B G M X I A		
9	GET & ASIDE WRENCH		A B G M X I A		
			A B G M X I A		
10	FINE ADJUST LEVEL SCREW PAIRS		A B G M X I A		
			A B G M X I A		
11	RESET POINTER TOOL		A B G M X I A		
12	TIGHTEN ALL 8 HOLD DOWN BOLTS	1	A ₁ B ₀ G ₃ A ₀ B ₃ A ₁ L ₃ A ₁ B ₀ P ₁ A ₀	(8)	1020
		2	A ₀ B ₀ G ₀ A ₀ B ₃ A ₁ F ₀ A ₀ B ₀ P ₀ A ₀	(4)	560
		4	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ F ₀ A ₁ B ₀ P ₁ A ₀		260
		5	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ F ₀ A ₀ B ₀ P ₀ A ₀		120
		8	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁ M ₁₆ A ₀ B ₀ P ₀ A ₀	16	5250
		10	A ₀ B ₀ G ₀ A ₀ B ₀ P ₃ F ₀ A ₀ B ₀ P ₀ A ₀	6	1740
		11	A ₁ B ₀ G ₃ A ₁ B ₃ P ₃ (F ₁₀) A ₁ B ₃ P ₁ A ₁	(2)	370
		12	A ₁ B ₀ G ₃ A ₀ B ₃ A ₁ F ₃ A ₁ B ₀ P ₁ A ₀	(8)	1020
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				13,370	

INGALLS Shipbuilding	MOST - calculation		CODE	2001.06	
			DATE	5-2-84	
			SIGN.	FWM	
	FIVE INCH GUN MOUNT FACING		PAGE	10-33	
ACTIVITY					
REMOVE JACK TAB BY BURNING					
CONDITIONS					
INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET TORCH LINES, REPLACE	1	A ₃ B ₆ G ₃ A ₃₂ B ₀ P ₆ A ₃₂	2	1640
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁	5	35
		4	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀		60
2	CONNECT & DISCONNECT LINES	6	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀		60
		11	A ₀ B ₀ G ₀ A ₁ B ₀ P ₃ A ₀		41
3	PLACE GLOVES, REMOVE GLOVES & GOGGLES	12	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ A ₀		26
			A B G A B P A		
4	PLACE GOGGLES		A B G A B P A		
			A B G A B P A		
5	OPEN & CLOSE VALVES		A B G A B P A		
			A B G A B P A		
6	GET & RETURN STRIKER		A B G A B P A		
			A B G A B P A		
7	LIGHT TORCH		A B G A B P A		
			A B G A B P A		
8	ADJUST FLAME		A B G A B P A		
			A B G A B P A		
9	LOWER GOGGLES		A B G A B P A		
		5	(A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀)	(2)2	120
10	RAISE GOGGLES	7	A ₁ B ₀ G ₀ M ₁ X ₀ I ₀ A ₀		20
		8	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀		31
11	POSITION TORCH	9	A ₁ B ₀ G ₁ M ₁ X ₀ I ₁ A ₀		40
		10	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀		30
12	ASIDE TORCH		A B G M X I A		
			A B G M X I A		
13	BURN (45 sec)		A B G M X I A		
		2	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁ A ₀ (P.A.F.)	(2)2	230
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		13		1310	1310
TIME =					6020

INGALLS Shipbuilding	MOST - calculation		CODE 2001.03		
	FIVE INCH GUN MOUNT FACING		DATE 5/2/84		
			SIGN. FWM		
			PAGE 10-30		
ACTIVITY SET UP MACHINE					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET & RETURN HAMMER & PUNCH	1	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	2	120
		2	A ₀ B ₀ G ₀ A ₁₀ B ₆ P ₆ A ₀	4	880
		5	A B G A B P A		0
2	PLACE PUNCH AT ALIGNMENT MARKS	7	A B G A B P A		0
		8	A ₃ B ₀ G ₃ A ₁₆ B ₆ P ₃ A ₁₆		470
3	CENTERPUNCH MARKS	9	A B G A B P A		0
4	INSPECT PUNCH MARKS	12	A B G A B P A		0
			A B G A B P A		
5	RIGGER GET MACHINE ON BOARD		A B G A B P A		
			A B G A B P A		
6	INSPECT ALIGNMENT		A B G A B P A		
			A B G A B P A		
7	RIGGER ADJUST & PLACE UNIT		A B G A B P A		
			A B G A B P A		
8	PLUG IN MACHINE & RETURN		A B G A B P A		
			A B G A B P A		
9	GUARD RAIL INSTALLED		A B G A B P A		
			A B G M X I A		
10	REMOVE & REPLACE OIL CAP		A B G M X I A		
			A B G M X I A		
11	INSPECT OIL LEVEL		A B G M X I A		
			A B G M X I A		
12	FILL OIL RESERVOIR		A B G M X I A		
			A B G M X I A		
		3	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁ A ₁ F ₆ A ₁ B ₀ P ₁ A ₀	(4)	340
		4	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁ A ₁ B ₀ P ₀ A ₀	4	40
		6	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁₀ T ₃ A ₀ B ₀ P ₀ A ₀	4	520
		10	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ L ₁₀ A ₁ B ₀ P ₁ A ₀	2	400
		11	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ T ₁ A ₁ B ₀ P ₁ A ₀		70
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				2840	

INGALLS Shipbuilding	<h1 style="margin: 0;">MOST - calculation</h1>					CODE 2001.02	
						DATE 5/2/84	
	FIVE INCH GUN MOUNT FACING					SIGN. FWM	
						PAGE 10-27	
ACTIVITY AREA TRAVEL							
CONDITIONS INTEGRATION AREA							
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TML		
1	FROM TOOL BOX TO WET DOCK TOOL RM & RETURN (CODE 1002.16)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
2	FROM TOOL BOX TO ELEVATOR FOR INTEGRATED SHIP & RETURN (CODE 1002.15)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
3	WAIT FOR ELEVATOR		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
4	WALK ONTO, RIDE, & WALK OFF OF ELEVATOR		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
5	SWING OPEN OR CLOSE OUTER DOORS		A B G A B P A				
			A B G A B P A				
6	SLIDE OPEN OR CLOSE INNER DOOR	3	A ₀ B ₀ G ₀ M ₀ X ₅₄ I ₀ A ₀	2	1080		
		4	A ₁₀ B ₀ G ₀ M ₀ X ₅₄ I ₀ A ₁₀	2	1480		
7	FROM ELEVATOR TO FWD 5 INCH GUN FOUNDATION & RETURN	5	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀	8	400		
		6	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀	8	400		
		7	A ₂₄ B ₀ G ₀ M ₀ X ₀ I ₀ A ₀	2	480		
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
		1	11,311	4	452		
		2	1520	2	3040		
TIME =						52,124	

FORM R-1458

INGALLS Shipbuilding	MOST - calculation		CODE 3001.05		
			DATE 7/2/84		
			SIGN. TLC		
	WASTE HEAT BOILER INSTALLATION		PAGE 10-84		
ACTIVITY AREA TRAVEL					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	FROM: TOOL BOX		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
	TO: WETDOCK TOOL ROOM		A B G A B P A		
	{ RETURN (CODE 1002.16)		A B G A B P A		
2	FROM: TOOL BOX		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
	TO: FREE STOCK		A B G A B P A		
	{ RETURN (CODE 1002.17)		A B G A B P A		
3	FROM: TOOL BOX		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
	TO: MODULE 2 STAIRS		A B G A B P A		
	{ RETURN (CODE 1002.12)		A B G A B P A		
4	FROM: MODULE 2 STAIRS		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
	TO: AMR NO. 1		A B G M X I A		
	{ RETURN (CODE 1002.18)		A B G M X I A		
5	RETURN TOOLS TO TOOL		A B G M X I A		
			A B G M X I A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
	ROOM IN WETDOCK BLDG.		A B G A B P A		
	{ RETURN TO TOOL BOX		A B G A B P A		
	(CODE 1002.16)		A B G A B P A		
6	FROM: AMR NO. 1		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
	TO: ENGINE ROOM NO. 1		A B G A B P A		
	{ RETURN (CODE 3001.051)		A B G A B P A		
			A B G A B P A		
		1	11311	2	22,622
		2	1960	2	3920
		3	3300	4	13,200
		4	2270	4	9,080
		5	11311	2	22,622
		6	5480	2	10,960
TIME =					82404

INGALLS Shipbuilding	MOST - calculation				CODE 3001.07	
	WASTE HEAT BOILER INSTALLATION				DATE 7/2/84	
					SIGN. TLC	
					PAGE 10-87	
ACTIVITY REMOVE TEMPORARY BOLTS						
CONDITIONS MODULE AREA						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	GANTRY L.O.S. BOILER	1	A B G A B P A		0	
		5	A ₀ B ₀ G ₀ A ₃ B ₆ P ₃ A ₀		128	
2	SET-UP TO UNBOLT (CODE 1005.01)	6	A ₀ B ₀ G ₀ A ₆ B ₆ P ₃ A ₀		152	
		7	A ₀ B ₀ G ₀ A ₃ B ₆ P ₃ A ₀		120	
3	UNBOLT 4 BOLTS (CODE 1005.06) - 1 1/4" BATS	8	A ₀ B ₀ G ₀ A ₆ B ₆ P ₃ A ₀		156	
		9	A ₀ B ₀ G ₀ A ₆ B ₆ P ₁ A ₀		136	
4	REMOVE 4 BOLTS (CODE 1005.03)		A B G A B P A			
			A B G A B P A			
5	WALK TO 1st LOCATION		A B G A B P A			
			A B G A B P A			
6	WALK TO LOCATION #3		A B G A B P A			
			A B G A B P A			
7	WALK TO LOCATION #4		A B G A B P A			
			A B G A B P A			
8	WALK TO LOCATION #6		A B G A B P A			
			A B G A B P A			
9	WALK TO TOOL BAG		A B G A B P A			
			A B G A B P A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
		2			860	
		3		4	2859	
		4		4	410	
TIME =					14,606	

INGALLS Shipbuilding	MOST - calculation		CODE 3001.12		
			DATE 7/2/84		
			SIGN. TLC		
	WASTE HEAT BOILER INSTALLATION		PAGE 10-92		
ACTIVITY LAYOUT, DRILL & SPOTFACE HOLES					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	LAYOUT HOLES (CODE 1003.20)	2	A ₀ B ₀ G ₀ (A ₃ B ₆ B) A ₆	(6)5	3000
2	TRAVEL		A B G A B P A		
3	POSITION DRILL (CODE 1004.11)		A B G A B P A		
4	PLUG IN EXTENSION CORD (CODE 1004.13)		A B G A B P A		
5	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A		
6	HAND FEED DRILL BIT (CODE 1004.15)		A B G A B P A		
7	DRILLING PROCESS TIME 1/4" HOLE MATERIAL CODE 0013 -1" DEPTH		A B G A B P A		
8	DRILLING PROCESS TIME 3/4" HOLE MATERIAL CODE 0013 -1" DEPTH		A B G A B P A		
9	DRILLING PROCESS TIME 1 1/4" HOLE MATERIAL CODE 0013 -1" DEPTH		A B G A B P A		
10	SPOT FACING (FACE MILLING) PROCESS TIME - .015" DEPTH		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	323	14	4522
		3	740	56	41,440
		4	2960		2960
		5	2400	4	9,600
		6	530	56	29,680
		7	293	14	4,102
		8	418	14	5,852
		9	637	14	8,918
		10	514	14	7,196
TIME =				117,270	

INGALLS Shipbuilding	MOST - calculation		CODE 3001.14			
			DATE 7/2/84			
	WASTE HEAT BOILER INSTALLATION		SIGN. TLC			
			PAGE 10-94			
ACTIVITY BOLT-UP WITH PERMANENT BOLTS						
CONDITIONS MODULE AREA						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	UNBOLT TEMPORARY BOLTS (CODE 1005.06)-5/16" BOLTS	4	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₀	14	1120	
		7	A ₀ B ₂ G ₀ A ₁ B ₀ P ₃ A ₁	14	700	
2	REMOVE TEMPORARY BOLTS (CODE 1005.03)		A B G A B P A			
			A B G A B P A			
3	POSITION PERMANENT BOLTS (CODE 1005.03)		A B G A B P A			
			A B G A B P A			
4	INSTALL SHIMS		A B G A B P A			
			A B G A B P A			
5	BOLT-UP WITH PERMANENT BOLTS (CODE 1005.07)-15/16" BOLTS		A B G A B P A			
			A B G A B P A			
6	CHECK PADS WITH FEELER GAGES		A B G A B P A			
			A B G A B P A			
7	TACK WELD PERMANENT BOLTS .98" BOLT @ .21 MIN/INCH		A B G A B P A			
			A B G A B P A			
8	REMOVE SHIMS WITH PLIERS		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
		7	(A ₃ B ₀ G ₁ M ₁ X ₃₂ I ₀) A ₆	(14)	5240	
		7	A ₁ B ₀ G ₁ M ₁ X ₀ I ₆ A ₀	14	420	
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
		6	A ₃ B ₆ G ₃ A ₆ P ₁ A ₃ M ₁ A ₆ B ₆ P ₃ A ₀	(24)	8430	
		8	A ₃ B ₆ G ₃ A ₆ P ₁ A ₃ M ₁ A ₆ B ₆ P ₃ A ₀	(14)	1120	
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
		1		2859	14	40026
		2		410	14	5,740
		3		410	14	5,740
		5		4860	14	68,040
TIME =					136,576	

INGALLS Shipbuilding	MOST - calculation					CODE 3002.01					
	AIR CONDITIONING PLANT INSTALLATION					DATE 5-15-84					
						SIGN. FWM					
						PAGE 10-95					
ACTIVITY JOB PREPARATION											
CONDITIONS ASSEMBLY & MODULE AREA											
NO.	METHOD	NO.	SEQUENCE MODEL				FR	TMU			
1	AVE. INITIAL JOB PREPARATION		A	B	G	A	B	P	A		
	(CODE 1001.12)		A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
2	OBTAIN OR RETURN TOOLS		A	B	G	A	B	P	A		
	FREE STOCK OR TOOL CRIB		A	B	G	A	B	P	A		
	(CODE 1001.121)		A	B	G	A	B	P	A		
3	AVE. ADDITIONAL JOB		A	B	G	A	B	P	A		
	PREPARATION (CODE 1001.22)		A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	M	X	I	A		
			A	B	G	M	X	I	A		
			A	B	G	M	X	I	A		
			A	B	G	M	X	I	A		
			A	B	G	M	X	I	A		
			A	B	G	M	X	I	A		
			A	B	G	M	X	I	A		
			A	B	G	M	X	I	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
			A	B	G	A	B	P	A		
		1					42001			42,00	
		2					15417		6	92,502	
		3					16597			16,597	
TIME =									151,100		

INGALLS Shipbuilding	MOST - calculation					CODE <div style="border: 1px solid black; padding: 2px;">3002.02</div>	
	AIR CONDITIONING PLANT INSTALLATION					DATE 5-15-84	
						SIGN. FWM	
						PAGE 10-96	
ACTIVITY AREA TRAVEL							
CONDITIONS ASSEMBLY & MODULE AREA							
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU		
1	FROM TOOL BOX TO WETDOCK TOOL RM & RETURN (CODE 1002.16)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
2	FROM TOOL BOX TO FREE STOCK & RETURN (CODE 1002.17)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
3	FROM TOOL BOX TO AMR #1 ON MODULE 2 & RETURN (CODE 1002.18)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
4	FROM TOOL BOX TO BAY 1 LOCATION OF A/C PLANT (488 FT)		A B G A B P A				
			A B G A B P A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
		1	11,311	4	45,244		
		2	1960	4	7840		
		3	2270	2	4540		
		4	3370	2	6740		
TIME =					64,364		

INGALLS Shipbuilding	MOST - calculation		CODE 3002.03		
			DATE 5-15-84		
	AIR CONDITIONING PLANT INSTALLATION		SIGN. FWM		
			PAGE 10-97		
ACTIVITY LAYOUT & DRILL LEG STANDS					
CONDITIONS ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TML
1	LAYOUT TO DRILL WITHOUT TEMPLATE	9	A ₀ B ₀ G ₀ (A ₆) B ₀ P ₀ A ₀	(6)4	1440
	(CODE 1003.10)		A B G A B P A		
			A B G A B P A		
2	POSITION DRILL (CODE 1004.11)		A B G A B P A		
			A B G A B P A		
3	PLUG IN EXTENSION (CODE 1004.13)		A B G A B P A		
			A B G A B P A		
4	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A		
			A B G A B P A		
5	HANDFEED DRILL BIT TO & FROM		A B G A B P A		
	WORKPIECE (CODE 1004.15)		A B G A B P A		
			A B G A B P A		
6	PROCESS TIME TO DRILL 1/8" DIA.		A B G A B P A		
	HOLE (MAT'L. & COND. CODE 0013		A B G A B P A		
	@ 1/2" DEPTH)		A B G M X I A		
			A B G M X I A		
7	PROCESS TIME TO DRILL 25/32" DIA		A B G M X I A		
	HOLE (MAT'L. & COND. CODE 0013		A B G M X I A		
	@ 1/2" DEPTH)		A B G M X I A		
			A B G M X I A		
8	PROCESS TIME TO DRILL 29/32" DIA		A B G A B P A B P A		
	HOLE (MAT'L. & COND. CODE		A B G A B P A B P A		
	0013 @ 1/2" DEPTH)		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
9	MOVE WITH EQUIP TO EACH LEG		A B G A B P A B P A		
	STAND TO LAYOUT & TO DRILL		A B G A B P A B P A		
			A B G A B P A B P A		
		1	1390	68	94.5
		2	740	136	100.64
		3	2960		2960
		4	2400	8	19.2
		5	530	136	72.08
		6	122	68	8296
		7	250	32	800
		8	324	36	11.66
TIME =				318,800	

INGALLS Shipbuilding	MOST - calculation		CODE		
			3002.04		
			DATE 5-15-84		
			SIGN. FWM		
AIR CONDITIONING PLANT INSTALLATION				PAGE 10-98	
ACTIVITY					
INSTALL DUMMY MOUNTS & LEG STANDS					
CONDITIONS					
ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SET UP TO BOLT (CODE 1005.02)	4	A1 B0 G1 A1 B0 P3 A0	12	720
		9	A1 B0 G3 A6 B0 P3 A0	12	1560
2	LOOSEN THEN TIGHTEN 1 1/2" BOLT (CODE 1005.04)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
3	REMOVE THEN POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
4	REMOVE & REPLACE MOUNTS		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
5	POSITION LEG STANDS		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
6	SET UP TO BOLT (CODE 1005.02.)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
7	POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
8	TURN 7/8" BOLT (CODE 1005.04)	5	A3 B0 G3 M3 X0 I6 A0	6	900
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
9	MOVE WITH EQUIP TO EACH LEG STAND.		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	970		970
		2	1676	24	40,244
		3	410	24	9840
		6	970		970
		7	410	36	14,760
		8	987	36	35,532
TIME =					105,496

INGALLS Shipbuilding	MOST - calculation		CODE <div style="border-bottom: 1px solid black; display: inline-block; width: 100%;">3002.05</div>		
	AIR CONDITIONING PLANT INSTALLATION		DATE <u>5-15-84</u>		
			SIGN. <u>FWM</u>		
			PAGE <u>10-99</u>		
ACTIVITY CHECK SNUBBER ALIGNMENT					
CONDITIONS ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	PLACE SNUBBER CONES IN SOCKETS	1	A, B O G, A, B O P, A O	8	320
		2	A, B O G 3 A, B O P 3 A, 8	720	
		9	A, B O G, A, B O P, A O	8	320
2	PLACE ON LEG STANDS	10	A O B O G O (A 6) B O P O A O (6) 5	1800	
			A B G A B P A		
3	SET UP TO BOLT (CODE 1005.01)		A B G A B P A		
			A B G A B P A		
4	POSITION & REMOVE BOLT FOR CONE		A B G A B P A		
	(CODE 1005.03)		A B G A B P A		
			A B G A B P A		
5	TIGHTEN & LOOSEN 1 1/2" BOLT		A B G A B P A		
	(CODE 1005.06)		A B G A B P A		
			A B G A B P A		
6	SET UP TO BOLT (CODE 1005.01)		A B G A B P A		
			A B G A B P A		
7	POSITION & REMOVE BOLT FOR SOCKET		A B G A B P A		
	(CODE 1005.03)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
8	PLACE ALLEN WRENCH, TIGHTEN &		A B G M X I A		
	LOOSEN (MINIMAL TO CHECK)		A B G M X I A		
			A B G M X I A		
9	REMOVE ASSEMBLIES FROM		A B G M X I A		
	LEG STANDS	8	A, B O G, A O B O P, A O (8) 8	18,240	
			A B G A B P A B P A		
			A B G A B P A B P A		
10	MOVE WITH EQUIP TO EACH		A B G A B P A B P A		
	LEG STAND		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3		860	860
		4		410	16 6.566
		5		2859	16 45.744
		6		860	860
		7		410	64 26.244
TIME =					101,664

INGALLS Shipbuilding	MOST - calculation		CODE		
			3002.06		
	AIR CONDITIONING PLANT INSTALLATION		DATE 5-15-84		
			SIGN. FWM		
		PAGE 10-100			
ACTIVITY INSTALL PERMANENT LEG STAND BOLTS & RAISE UNIT					
CONDITIONS ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	PLACE PLANT ON MODULE	1	A B G A B P A		0
		2	A B G A B P A		0
2	WELD LEG STANDS IN PLACE	6	A ₁₆ B ₆ G ₃ A ₁₆ B ₆ P ₆ A ₀	2	1060
		9	A ₁ B ₆ G ₃ A ₁₆ B ₆ P ₁ A ₁₆	2	980
3	SET UP TO BOLT (CODE 1005.02)	12	A ₀ B ₀ G ₀ (A ₆) B ₀ P ₀ A ₀	(6)3	1080
			A B G A B P A		
4	LOOSEN 7/8" BOLT		A B G A B P A		
			A B G A B P A		
	(CODE 1005.04)		A B G A B P A		
			A B G A B P A		
5	REMOVE BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
6	GET HYDRAULIC JACKS & HANDLES.		A B G A B P A		
			A B G A B P A		
	& PLACE UNDER PLANT		A B G A B P A		
			A B G A B P A		
7	PLACE HANDLE & JACK UNIT UP		A B G A B P A		
			A B G A B P A		
8	JACK UNIT DOWN & ASIDE HANDLE		A B G M X I A		
			A B G M X I A		
9	REMOVE JACKS		A B G M X I A		
			A B G M X I A		
10	POSITION BOLT (CODE 1005.03)		A B G M X I A		
			A B G M X I A		
11	TIGHTEN 7/8" BOLT (CODE 1005.05)		A B G M X I A		
		7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ F ₂₄ A ₀ B ₀ P ₀ A ₀	2	600
12	MOVE WITH EQUIP TO EACH	8	A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ F ₂₄ A ₁ B ₀ P ₁ A ₀	2	560
			A B G A B P A B P A		
	LEG STAND		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3		970	970
		4		987	36 35,532
		5		410	36 14,760
		10		410	36 14,760
		11		1431	36 51,516
TIME =				121,818	

INGALLS Shipbuilding	MOST - calculation		CODE 3002.07		
			DATE 5-15-84		
			SIGN. FWM		
	AIR CONDITIONING PLANT INSTALLATION		PAGE 10-101		
ACTIVITY INSTALL RESILIENT MOUNTS (WHILE UNIT JACKED UP)					
CONDITIONS ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SETUP TO BOLT (CODE 1005.01)	4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	12	720
		7	A ₀ B ₀ G ₀ (A ₆) B ₀ P ₀ A ₀	(6)	360
2	LOOSEN 1 1/2" BOLT (CODE 1005.04)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
3	REMOVE BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
4	REMOVE & REPLACE MOUNTS		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
5	POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
6	TIGHTEN 1 1/2" BOLT (CODE 1005.05)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
7	MOVE WITH EQUIP TO EACH LEG STAND		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	860		860
		2	1676	12	20,112
		3	410	12	4920
		5	410	12	4920
		6	2430	12	29,160
TIME =				61,052	

INGALLS Shipbuilding	MOST - calculation		CODE		
			3002.08		
	AIR CONDITIONING PLANT INSTALLATION		DATE 5-15-84		
			SIGN. FWM		
		PAGE 10-102			
ACTIVITY INSTALL SNUBBER CONES & LINERS					
CONDITIONS ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	PLACE SNUBBER CONES IN SOCKETS	1	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	8	320
		2	A ₁ B ₀ G ₃ A ₁ B ₀ P ₃ A ₁	8	720
2	PLACE ON LEG STANDS	8	A ₁ B ₆ G ₃ A ₁ B ₀ P ₃ A ₀	8	1120
		17	A ₀ B ₀ G ₀ (A ₆) B ₀ P ₀ A ₀	65	1800
3	SET UP TO BOLT (CODE 1005.01)		A B G A B P A		
			A B G A B P A		
4	POSITION BOLT FOR CONE (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
5	TIGHTEN 1½" BOLT (CODE 1005.06)		A B G A B P A		
			A B G A B P A		
6	MEASURE VERT. GAP - CONE TO SOCKET		A B G A B P A		
			A B G A B P A		
7	MARK MEASUREMENT ON LEG STAND		A B G A B P A		
			A B G A B P A		
8	DISTRIBUTE LINERS FOR EACH SNUBBER		A B G A B P A		
			A B G A B P A		
9	ALIGN HOLES IN LINERS	9	A ₁ B ₀ G ₃ (M ₁ X ₀ 116) A ₀	(3) 8	4400
		10	A ₁ B ₀ G ₁ M ₁ X ₀ 10 A ₀	8	240
10	LIFT SOCKET	11	A ₀ B ₀ G ₀ (M ₁ X ₀ 116) A ₀	(8)	1360
			A B G M X I A		
11	ALIGN LINER SET WITH BOLT HOLES		A B G M X I A		
			A B G M X I A		
12	SET UP TO BOLT (CODE 1005.01)		A B G M X I A		
			A B G M X I A		
13	POSITION & REMOVE BOLT FOR SOCKET (CODE 1005.03)	6	A ₁ B ₀ G ₁ A ₀ B ₀ (P ₁ A ₆ M ₁ X ₀ 116) A ₀	(8)	1880
		7	A ₁ B ₀ G ₁ A ₀ B ₀ (P ₁ A ₁ R ₁₀ A ₁ B ₀ P ₁ A ₀	(8)	1000
		14	A ₁ B ₀ G ₁ A ₀ B ₀ (P ₃ A ₁ F ₁₅₂ A ₁ B ₀ P ₁ A ₀	(8) 8	100,160
		15	A ₁ B ₀ G ₁ A ₀ B ₀ (P ₁ A ₆ M ₁ X ₀ 116) A ₀	(8)	2520
14	PLACE ALLEN WRENCH, TIGHTEN & LOOSEN	16	A ₁ B ₀ G ₁ A ₀ B ₀ (P ₁ A ₁ R ₃ A ₁ B ₀ P ₁ A ₀	(8)	440
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
15	CHECK FOR 1/8" VERT. GAP		A B G A B P A B P A		
			A B G A B P A B P A		
16	MARK PLACES REQUIRE SHIMS		A B G A B P A B P A		
			A B G A B P A B P A		
17	MOVE WITH EQUIP TO EACH LEG STAND		A B G A B P A B P A		
		3		860	860
		4		410	8 3280
		5		2859	8 22872
		12		860	860
		13		410	64 26,240
TIME =				170,072	

INGALLS Shipbuilding		MOST - calculation		CODE 3002.09	
		AIR CONDITIONING PLANT INSTALLATION		DATE 5-15-84	
				SIGN. FWM	
				PAGE 10-103	
ACTIVITY CUT OUT SHIMS					
CONDITIONS ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	PLACE BOARD & ASIDE	1	A ₁₀ B ₆ G ₁ A ₁₀ B ₀ P ₃ A ₀	2	600
		2	A ₃ B ₆ G ₃ A ₃ B ₀ P ₁ A ₀	2	320
2	PUT TOOLS ON BOARD & ASIDE	5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	8	320
		7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	4	160
3	UNWRAP SHIM STOCK	10	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	12	480
		14	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀		60
4	UNROLL SHIM STOCK	15	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	16	640
		16	A ₁ B ₀ G ₁ (A ₁ B ₀ P ₆) A ₀	(4)	300
5	PLACE SNUBBER SOCKET ON STOCK	17	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀		40
		19	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ A ₀	8	160
6	SCRIBE OUTLINE & HOLES ON STOCK		A B G A B P A		
			A B G A B P A		
7	REMOVE SNUBBER		A B G A B P A		
			A B G A B P A		
8	CUT STOCK		A B G A B P A		
			A B G A B P A		
9	CUT OUT OUTLINE		A B G A B P A		
		4	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀	4	200
10	ASIDE SHIMS & SCRAP	11	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀		50
		13	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀		50
11	UNROLL TAPE		A B G M X I A		
			A B G M X I A		
12	CUT TAPE		A B G M X I A		
			A B G M X I A		
13	RE ROLL SHIM STOCK		A B G M X I A		
			A B G M X I A		
14	TAPE SHIM STOCK ROLL & ASIDE	3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ C ₃ A ₁ B ₀ P ₁ A ₀		90
		6	A ₁ B ₀ G ₁ A ₁ B ₀ (P ₁ R ₃) A ₁ B ₀ P ₁ A ₀	(5) 8	2000
15	PLACE SHIM & ASIDE	8	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ C ₆ A ₁ B ₀ P ₁ A ₀	4	480
		9	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ C ₆ A ₀ B ₀ P ₀ A ₀	8	1440
16	GET PUNCH & PLACE	12	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ C ₃ A ₁ B ₀ P ₁ A ₀		90
		18	A ₁ B ₀ G ₁ A ₁ B ₀ (P ₁ F ₆) A ₀ B ₀ P ₀ A ₀	(4) 8	2480
17	GET & ASIDE HAMMER	20	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ F ₁₆ A ₀ B ₀ P ₀ A ₀	8	1280
		21	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ C ₆ A ₁ B ₀ P ₁ A ₀	4	480
18	HAMMER PUNCH		A B G A B P A B P A		
			A B G A B P A B P A		
19	ASIDE PUNCH		A B G A B P A B P A		
			A B G A B P A B P A		
20	HAMMER SHIM FLAT		A B G A B P A B P A		
			A B G A B P A B P A		
21	CUT SHIMS IN HALF				
TIME =					11,720

INGALLS Shipbuilding	MOST - calculation		CODE 3002.10		
	AIR CONDITIONING PLANT INSTALLATION		DATE 5-15-84		
			SIGN. FWM		
			PAGE 10-104		
ACTIVITY INSTALL SHIMS & BOLT DOWN SNUBBER SOCKETS					
CONDITIONS ASSEMBLY & MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	LIFT SOCKET	7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀		40
		9	A ₁ B ₀ G ₁ A ₁ B ₀ P ₆ A ₀	32	2880
2	PLACE SHIM IN ALIGN TO LEG	11	A B G A B P A		0
			A B G A B P A		
	STAND HOLES		A B G A B P A		
			A B G A B P A		
3	SET UP TO BOLT (CODE 1005.01)		A B G A B P A		
4	POSITION BOLT (CODE 1005.03)		A B G A B P A		
5	PLACE ALLEN WRENCH,		A B G A B P A		
	TIGHTEN SCREW		A B G A B P A		
6	CHECK FOR 1/8" VERT. GAP		A B G A B P A		
7	GET & ASIDE PLIERS		A B G A B P A		
8	GET & CUT WIRE	1	A ₆ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	8	640
		2	A ₁ B ₀ G ₁ M ₁ X ₀ I ₁₆ A ₀	8	1520
9	PLACE WIRE THRU SCREWHEADS		A B G M X I A		
			A B G M X I A		
10	GATHER ENDS & TWIST		A B G M X I A		
			A B G M X I A		
11	PAINT LINERS		A B G M X I A		
		5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁ F ₁₅₂ A ₁ B ₀ P ₁ A ₀	(4) 8	50320
		6	A ₁ B ₀ G ₁ A ₀ B ₀ P ₁ A ₆ M ₂₄ A ₁ B ₀ P ₁ A ₀	(8)	2520
		8	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ C ₃ A ₁ B ₀ P ₁ A ₀	(4) 4	840
		10	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁ A ₁ C ₆ A ₀ B ₀ P ₀ A ₀	16	1280
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3		860	860
		4		410	32 13,120
TIME =				74,020	

FORM R-1458

INGALLS Shipbuilding	MOST - calculation		CODE 3003.04		
			DATE 4/27/84		
	CHILL WATER PUMP INSTALLATION		SIGN. T.L.C.		
			PAGE 10-108		
ACTIVITY INSTALL PERMANENT MOUNTS					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	RIGGERS REMOVE PUMP FROM FOUNDATION	1	A B G A B P A		0
		2	A B G A B P A		0
		3	A B G A B P A		0
		5	A ₁ B ₆ G ₁ A ₁ B ₂ P ₁ A ₃	4	520
2	PRODUCTION WELDER WELDS COMPLETE FOUNDATION	8	A ₃ B ₆ G ₀ (A ₃) B ₀ P ₀ A ₃	(4)	240
			A B G A B P A		
3	PAINTER PAINTS FOUNDATION		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
4	SET-UP FOR BOLTING (CODE 1005.02)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
5	PLACE RESILIENT MOUNT IN POSITION		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
6	POSITION BOLT-5/8" (CODE 1005.03)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
7	POSITION BOLT-3/4" (CODE 1005.03)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
8	TRAVEL		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		4	970		970
		6	410	8	3,280
		7	410	4	1,640
TIME =				6,650	

INGALLS Shipbuilding	MOST - calculation	CODE <div style="font-size: 1.2em;">3004.02</div>																																																																																																																																																																																
		DATE <div style="font-size: 1.2em;">4/19/84</div>																																																																																																																																																																																
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION	SIGN. <div style="font-size: 1.2em;">TLC</div> PAGE <div style="font-size: 1.2em;">10-111</div>																																																																																																																																																																																
ACTIVITY <div style="font-size: 1.2em;">AREA TRAVEL</div>																																																																																																																																																																																		
CONDITIONS <div style="font-size: 1.2em;">MODULE AREA</div>																																																																																																																																																																																		
NO.	METHOD	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:5%;">NO.</th> <th style="width:65%;">SEQUENCE MODEL</th> <th style="width:10%;">FR</th> <th style="width:20%;">TMU</th> </tr> <!-- Activity 1 --> <tr><td rowspan="5">1</td><td>FROM: TOOL BOX</td><td>A B G A B P A</td><td></td></tr> <tr><td></td><td>A B G A B P A</td><td></td></tr> <tr><td rowspan="3">TO: WET DOCK TOOL ROOM</td><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td rowspan="3">% RETURN (CODE 1002.16)</td><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <!-- Activity 2 --> <tr><td rowspan="5">2</td><td>FROM: TOOL BOX</td><td>A B G A B P A</td><td></td></tr> <tr><td></td><td>A B G A B P A</td><td></td></tr> <tr><td rowspan="3">TO: FREE STOCK</td><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td rowspan="3">% RETURN (CODE 1002.17)</td><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <!-- Activity 3 --> <tr><td rowspan="5">3</td><td>FROM: TOOL BOX</td><td>A B G A B P A</td><td></td></tr> <tr><td></td><td>A B G A B P A</td><td></td></tr> <tr><td rowspan="3">TO : MODULE 2 STAIRS</td><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td rowspan="3">% RETURN (CODE 1002.12)</td><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <tr><td>A B G A B P A</td><td></td></tr> <!-- Activity 4 --> <tr><td rowspan="5">4</td><td>FROM: MODULE 2 STAIRS</td><td>A B G M X I A</td><td></td></tr> <tr><td></td><td>A B G M X I A</td><td></td></tr> <tr><td rowspan="3">TO : AMR NO. 1</td><td>A B G M X I A</td><td></td></tr> <tr><td>A B G M X I A</td><td></td></tr> <tr><td>A B G M X I A</td><td></td></tr> <tr><td rowspan="3">% RETURN (CODE 1002.18)</td><td>A B G M X I A</td><td></td></tr> <tr><td>A B G M X I A</td><td></td></tr> <tr><td>A B G M X I A</td><td></td></tr> <!-- Activity 5 --> <tr><td rowspan="5">5</td><td>RETURN TOOLS TO TOOL-</td><td>A B G M X I A</td><td></td></tr> <tr><td></td><td>A B G M X I A</td><td></td></tr> <tr><td rowspan="3">ROOM IN WET DOCK BLDG.</td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td rowspan="3">% RETURN TOOL TOOL BOX</td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td rowspan="3">(CODE 1002.16)</td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td rowspan="3"></td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td rowspan="3"></td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td rowspan="3"></td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td rowspan="3"></td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td rowspan="3"></td><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>A B G A B P A B P A</td><td></td></tr> <tr><td>1</td><td></td><td>11311</td><td>2</td><td>22622</td></tr> <tr><td>2</td><td></td><td>1960</td><td>2</td><td>392</td></tr> <tr><td>3</td><td></td><td>3300</td><td>2</td><td>6600</td></tr> <tr><td>4</td><td></td><td>2270</td><td>2</td><td>4540</td></tr> <tr><td>5</td><td></td><td>11311</td><td>2</td><td>22622</td></tr> </table>	NO.	SEQUENCE MODEL	FR	TMU	1	FROM: TOOL BOX	A B G A B P A			A B G A B P A		TO: WET DOCK TOOL ROOM	A B G A B P A		A B G A B P A		A B G A B P A		% RETURN (CODE 1002.16)	A B G A B P A		A B G A B P A		A B G A B P A		2	FROM: TOOL BOX	A B G A B P A			A B G A B P A		TO: FREE STOCK	A B G A B P A		A B G A B P A		A B G A B P A		% RETURN (CODE 1002.17)	A B G A B P A		A B G A B P A		A B G A B P A		3	FROM: TOOL BOX	A B G A B P A			A B G A B P A		TO : MODULE 2 STAIRS	A B G A B P A		A B G A B P A		A B G A B P A		% RETURN (CODE 1002.12)	A B G A B P A		A B G A B P A		A B G A B P A		4	FROM: MODULE 2 STAIRS	A B G M X I A			A B G M X I A		TO : AMR NO. 1	A B G M X I A		A B G M X I A		A B G M X I A		% RETURN (CODE 1002.18)	A B G M X I A		A B G M X I A		A B G M X I A		5	RETURN TOOLS TO TOOL-	A B G M X I A			A B G M X I A		ROOM IN WET DOCK BLDG.	A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A		% RETURN TOOL TOOL BOX	A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A		(CODE 1002.16)	A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A			A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A			A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A			A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A			A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A			A B G A B P A B P A		A B G A B P A B P A		A B G A B P A B P A		1		11311	2	22622	2		1960	2	392	3		3300	2	6600	4		2270	2	4540	5		11311	2	22622
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5		11311	2	22622																																																																																																																																																																														
TIME =		60,304																																																																																																																																																																																

INGALLS Shipbuilding	MOST - calculation						CODE <div style="font-size: 18pt; font-weight: bold;">3004.03</div>
							DATE <u>4/19/84</u>
							SIGN. <u>TLC</u>
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION						PAGE 10-112
ACTIVITY PREPARATION FOR BURNING PADS							
CONDITIONS MODULE AREA							
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU		
1	MEASURE LAYOUT LINES		A B G A B P A				
			A B G A B P A				
2	DRAW LAYOUT LINES		A B G A B P A				
			A B G A B P A				
3	PUNCH HOLES		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
		1	A ₁ B ₀ G ₃ A ₀ B ₀ (P ₁ A ₁ H ₃)A ₁ B ₀ P ₁ A ₀	(12)	4140		
		2	A ₁ B ₀ G ₃ A ₀ B ₀ (P ₁ A ₁ R ₃)A ₁ B ₀ P ₁ A ₀	(12)	660		
		3	A ₁ B ₀ G ₃ A ₀ B ₀ (P ₁ A ₁ F ₃)A ₁ B ₀ P ₁ A ₀	(20)	1060		
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
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			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
TIME =						5860	

INGALLS Shipbuilding	MOST - calculation		CODE 3004.06		
			DATE 4/19/84		
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION		SIGN. TLC		
			PAGE 10-115		
ACTIVITY DRILL PADS					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TH
1	ALIGN RULE		A B G A B P A		
			A B G A B P A		
2	DRAW DIAGONAL LINES		A B G A B P A		
			A B G A B P A		
3	CENTER PUNCH HOLES		A B G A B P A		
			A B G A B P A		
4	PUT CHOCK IN JIG		A B G A B P A		
			A B G A B P A		
5	CHANGE DRILL BIT		A B G A B P A		
			A B G A B P A		
	(CODE 1004.14)		A B G A B P A		
			A B G A B P A		
6	HAND FEED DRILL TO AND FROM		A B G A B P A		
			A B G A B P A		
	WORKPIECE (CODE 1004.15)		A B G A B P A		
			A B G A B P A		
7	PROCESS TIME FOR DRILL		A B G A B P A		
			A B G A B P A		
	1/8" PILOT HOLE. (MAT'L AND COND.	1	A ₁ B ₀ G ₃ M ₀ X ₀ (13 A ₁)	(8)	3
			A B G M X I A		
			A B G M X I A		
	CODE 0013 @ 1/4" DEPTH.)		A B G M X I A		
			A B G M X I A		
8	PROCESS TIME FOR DRILL		A B G M X I A		
			A B G M X I A		
	25/32" HOLE. (MAT'L AND COND.		A B G M X I A		
			A B G M X I A		
	CODE 0013 @ 1/4" DEPTH)	2	A ₁ B ₀ G ₃ A ₀ B ₀ (P ₁ A ₁ R ₃) A ₁ B ₀ P ₁ A ₀	(8)	4
		3	A ₁ B ₀ G ₃ A ₁ B ₀ (P ₁ A ₁ F ₆) A ₁ B ₀ P ₁ A ₀	(4)	3
		4	A ₁ B ₀ G ₁ A ₁ B ₀ F ₃₄ A ₁ B ₀ P ₁ A ₀	8	4,90
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		5		2400	2
		6		530	8
		7		65	4
		8		165	4
TIME =				16,130	

FORM R-1458

INGALLS Shipbuilding	MOST - calculation		CODE 3004.08		
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION		DATE 4/19/84		
			SIGN. TLC		
PAGE 10-117					
ACTIVITY DRILL FOUNDATION					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TI
1	POSITION DRILL (CODE 1004.11)	7	A3 B6 G0 (A3) B0 P0 A3	(4)	24
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
2	PLUG IN EXTENSION CORD (CODE 1004.13)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
3	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
4	HAND FEED DRILL BIT TO AND FROM WORKPIECE (CODE 1004.15)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
5	PROCESS TIME FOR DRILL 1/8" HOLE (MAT'L AND COND. CODE 0013 @ 1/4" DEPTH)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
6	PROCESS TIME FOR DRILL 25/32" HOLE (MAT'L AND COND. CODE 0013 @ 1/4" DEPTH)		A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
7	TRAVEL BETWEEN HOLES		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	740	8	5.92
		2	2.960		2.96
		3	2.400	2	4.16
		4	530	8	42.4
		5	65	4	2.6
		6	165	4	6.6
TIME =					19,080

INGALLS Shipbuilding	MOST - calculation		CODE	3004.10	
			DATE	4/19/84	
			SIGN.	TLC	
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION		PAGE	10-119	
ACTIVITY MEASURE AND CUT SHIM STOCK					
CONDITIONS MODULE AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TR
1	GET FEELER GAGE	3	A ₁ B ₆ G ₃ A ₁ B ₀ P ₁ A ₀		12
		6	A B G A B P A		
2	USE AND ASIDE FEELER GAGE		A B G A B P A		
			A B G A B P A		
3	GET SHIM STOCK		A B G A B P A		
			A B G A B P A		
4	MEASURE SHIM STOCK		A B G A B P A		
			A B G A B P A		
5	CUT SHIM STOCK		A B G A B P A		
			A B G A B P A		
6	RIGGERS REMOVE EQUIPT OFF FOUNDATION		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		1	A ₁ B ₀ G ₃ A ₀ B ₀ P ₀ A ₀		4
		2	A ₀ B ₀ G ₀ A ₃ B ₀ (P ₁ A ₁ H ₂)A ₁ B ₀ P ₁ A ₀	(3)7	3:
		4	A ₁ B ₆ G ₃ A ₁ B ₀ (P ₁ A ₁ H ₂)A ₁ B ₀ P ₁ A ₀	(2)	8:
		5	A ₁ B ₆ G ₃ A ₁ B ₀ (P ₁ A ₁ G ₁₀)A ₁ B ₀ P ₁ A ₀	(12)	157
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				6.00	

INGALLS Shipbuilding	MOST - calculation				CODE 3004.13	
					DATE 4/19/84	
					SIGN. TLC	
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION				PAGE 10-122	
ACTIVITY INSTALL AND REMOVE TEMPORARY FASTNERS						
CONDITIONS MODULE AREA						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	RIGGER PLACE EQUIPT. ON FDN.	1	A B G A B P A		0	
		9	A B G A B P A		0	
2	SET-UP FOR BOLT-UP (CODE	10	A ₃ B ₆ G ₀ (A ₃) B ₀ P ₀ A ₃ (4)		240	
	(1005.02)		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
3	POSITION BOLT (CODE		A B G A B P A			
	1005.03)		A B G A B P A			
			A B G A B P A			
4	TURN BOLT (CODE		A B G A B P A			
	1005.04) - 3/4" BOLT		A B G A B P A			
			A B G A B P A			
5	GET FEELER GAGES		A B G A B P A			
			A B G A B P A			
6	USE AND ASIDE GAGES		A B G A B P A			
			A B G A B P A			
7	UNBOLT - TURN BOLT (CODE		A B G M X I A			
	1005.04) - 3/4" BOLT		A B G M X I A			
			A B G M X I A			
			A B G M X I A			
8	REMOVE BOLT (CODE 1005.03)		A B G M X I A			
			A B G M X I A			
9	RIGGER REMOVE EQUIPT FROM		A B G M X I A			
	FOUNDATION	5	A ₁ B ₀ G ₃ A ₀ B ₀ P ₀ A ₀ B ₀ P ₀ A ₀		40	
		6	A ₀ B ₀ G ₀ A ₃ B ₆ (P ₁ A ₀ M ₀) A ₁ B ₀ P ₁ A ₀ (3) 4		3560	
10	TRAVEL		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
		2		970		970
		3		410	4	1640
		4		838	4	3352
		7		838	4	3352
		8		410	4	1640
TIME =					14,794	

INGALLS Shipbuilding	MOST - calculation				CODE 3004.15	
	HIGH PRESSURE AIR DEHYDRATOR INSTALLATION				DATE 4/19/84	
					SIGN. TLC	
					PAGE 10-124	
ACTIVITY INSTALL SELF LOCKING FASTNERS						
CONDITIONS SUB-ASSEMBLY AND MODULE AREA						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	RIGGER PLACE EQUIPT ON FDN.	1	A B G A B P A		0	
		5	A 3 B G (A3) B P A3	(4)	240	
2	BOLT-UP-SET-UP (CODE 1005.02)		A B G A B P A			
3	POSITION BOLT (CODE 1005.03)		A B G A B P A			
4	TURN BOLT (CODE 1005.05) - 3/4" BOLT		A B G A B P A			
5	TRAVEL		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
		2		970		970
		3		410	4	1640
		4		1215	4	4860
TIME =					7710	

INGALLS Shipbuilding	MOST - calculation		CODE	3005.03	
			DATE	6/26/84	
	BOAT HANDLING WINCH INSTALLATION		SIGN.	TLC	
PAGE			10-127		
ACTIVITY DRILL PADS					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMI
1	ALIGN RULE		A B G A B P A		
			A B G A B P A		
2	DRAW DIAGONAL LINES		A B G A B P A		
			A B G A B P A		
3	CENTER PUNCH HOLES		A B G A B P A		
			A B G A B P A		
4	PUT CHOCK IN JIG		A B G A B P A		
			A B G A B P A		
5	CHANGE DRILL BIT		A B G A B P A		
	(CODE 1004.14)		A B G A B P A		
			A B G A B P A		
6	HAND FEED DRILL TO AND FROM		A B G A B P A		
	WORKPIECE (CODE 1004.15)		A B G A B P A		
			A B G A B P A		
7	PROCESS TIME FOR DRILL		A B G A B P A		
	1/4" PILOT HOLE. (MAT'L AND COND.	1	A ₁ B ₀ G ₃ M ₀ X ₀ (13 A ₁)	(22)	921
	CODE 0187 @ 1/4" DEPTH.)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
8	PROCESS TIME FOR DRILL		A B G M X I A		
	3/4" HOLE. (MAT'L AND COND.		A B G M X I A		
	CODE 0187 @ 1/4" DEPTH)	2	A ₁ B ₀ G ₃ A ₀ B ₀ P ₁ A ₁ R ₃ A ₁ B ₀ P ₁ A ₀	(22)	1160
		3	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₁ F ₆ A ₁ B ₀ P ₁ A ₀	(11)	951
		4	A ₁ B ₀ G ₁ A ₁ B ₀ R ₃ F ₃₄ A ₁ B ₀ P ₁ A ₀	22	1364
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		5		2400	2 4801
		6		530	11 5836
		7		20	11 220
		8		39	11 429
TIME =				27,949	

INGALLS Shipbuilding	MOST - calculation		CODE 3005.05			
	BOAT HANDLING WINCH INSTALLATION		DATE 6/26/84			
			SIGN. TLC			
			PAGE 10-129			
ACTIVITY DRILL FOUNDATION						
CONDITIONS INTEGRATION AREA						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	POSITION DRILL (CODE 1004.11)	7	A ₃ B ₆ G ₁ (A ₃ B ₆ P ₀) A ₃	(11)	1120	
2	PLUG IN EXTENSION CORD (CODE 1004.13)		A B G A B P A			
3	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A			
4	HAND FEED DRILL BIT (CODE 1004.15)		A B G A B P A			
5	PROCESS TIME-DRILL 1/4" PILOT HOLE (MAT'L CODE 0187)-1 1/4" DEPTH		A B G A B P A			
6	PROCESS TIME-DRILL 3/4" HOLE (MAT'L CODE 0187)-1 1/4" DEPTH		A B G A B P A			
7	TRAVEL		A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G A B P A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G M X I A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
			A B G A B P A B P A			
		1		740	11	8,140
		2		2960		2,960
		3		2400	2	4,800
		4		530	22	11,660
		5		20	11	220
		6		39	11	429
TIME =					29,329	

INGALLS Shipbuilding	MOST - calculation		CODE 3005.06		
			DATE 6/26/84		
	BOAT HANDLING WINCH INSTALLATION		SIGN. TLL		
			PAGE 10-130		
ACTIVITY INSTALL TEMPORARY BOLTS					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SET-UP TO BOLT-UP (CODE 1005.02)	2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁	11	770
		5	A ₃ B ₆ G ₀ (A ₃ B ₆ P ₀) A ₃	11	1,110
2	PLACE PADS ON FOUNDATION		A B G A B P A		
			A B G A B P A		
3	POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
4	BOLT-UP (CODE 1005.04) - 3/4" BOLT		A B G A B P A		
			A B G A B P A		
5	TRAVEL		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1		970	970
		3		410	11 4510
		4		838	11 9218
TIME =				16,578	

INGALLS Shipbuilding		MOST - calculation	CODE 3005.0		
			DATE 6/26/84		
			SIGN. TLC		
BOAT HANDLING WINCH INSTALLATION		PAGE 10-131			
ACTIVITY WELD PADS					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	
1	PLACE WELDING MASK	1	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀		
		2	A ₃ B ₀ G ₁ A ₃ B ₀ P ₀ A ₃		
2	GET WELDING WHIP	5	A ₀ B ₀ G ₀ (A ₁ B ₆ P ₃)A ₀	(4)11	L
		6	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ A ₀		
3	FEED WIRE		A B G A B P A		
			A B G A B P A		
4	RAISE & LOWER MASK		A B G A B P A		
			A B G A B P A		
5	POSITION WHIP		A B G A B P A		
			A B G A B P A		
6	ASIDE WHIP		A B G A B P A		
			A B G A B P A		
7	WELD (9 SECS PER SIDE) (3'X3" ALUM)		A B G A B P A		
			A B G A B P A		
8	INSPECT WELD		A B G A B P A		
			A B G A B P A		
9	WAIT FOR WELD TO COOL (10 MIN)		A B G A B P A		
			A B G A B P A		
		3	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀		
		4	(A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀)	(2)44	
		7	(A ₁ B ₀ G ₁ M ₁ X ₂ I ₀ A ₁)	(4)11	12
		9	A ₀ B ₀ G ₀ M ₀ X ₃ I ₀ A ₀	5.05	16
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		8	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ (₃)A ₀ B ₀ P ₀ A ₀	(4)11	/
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				37.55	

INGALLS Shipbuilding	MOST - calculation		CODE 3005.08		
			DATE 6/26/84		
	BOAT HANDLING WINCH INSTALLATION		SIGN. TLL		
			PAGE 10-132		
ACTIVITY INSTALL FITTED BOLTS					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SETUP TO 4N BOLT (CODE 1005.02)	4	A 3 B 6 G 3 A 3 B 0 P 6 A 0		210
			A B G A B P A		
2	UNBOLT & BOLT-UP (CODE 1005.04) 3/4" BOLT		A B G A B P A		
			A B G A B P A		
3	REMOVE & INSTALL BOLTS (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
4	PLACE FOUNDATION AGAINST WINCH		A B G A B P A		
			A B G A B P A		
5	PLUG IN EXTENSION CORD (CODE 1004.13)		A B G A B P A		
			A B G A B P A		
6	CHANGE REAMER (CODE 1004.14)		A B G A B P A		
			A B G A B P A		
7	HAND FEED REAM TO & FROM WORK (CODE 1004.21)		A B G A B P A		
			A B G A B P A		
8	REAM HOLES (12.33 SECS/HOLE)		A B G A B P A		
			A B G A B P A		
9	TAP BOLTS		A B G A B P A		
			A B G A B P A		
		8	A 1 B 0 G 1 M 1 X 32 10 A 0	11	3,850
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		9	A 3 B 6 G 1 A 3 B (P 1 A 3 F 16) A 3 B P A 3	(21)	4,460
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1		970	970
		2		838	32 26,816
		3		410	32 13,120
		5		2960	2,960
		6		2400	2,400
		7		110	11 1,210
TIME =					55,996

INGALLS Shipbuilding	MOST - calculation		CODE 3005.09	
	BOAT HANDLING WINCH INSTALLATION		DATE 6/26/84	
		SIGN. TLC	PAGE 10-133	
ACTIVITY FILE PADS				
CONDITIONS INTEGRATION AREA				
NO.	METHOD	NO.	SEQUENCE MODEL	FR
1	CHECK PADS WITH FEELER GAGE	5	A ₁ B ₀ G ₃ A ₃ B ₆ P ₁ A ₃	2
		6	A ₃ B ₆ G ₁ (A ₃ B ₆ P ₃ A ₀)	(5) 4
2	UNBOLT (CODE 1005.04) - 3/4" BOLT	8	A ₃ B ₆ G ₃ A ₃ B ₀ P ₃ A ₀	2
			A B G A B P A	
3	REMOVE BOLTS (CODE 1005.03)		A B G A B P A	
			A B G A B P A	
4	TAP BOLTS (16 TAPS)		A B G A B P A	
			A B G A B P A	
5	ASIDE FOUNDATION		A B G A B P A	
			A B G A B P A	
6	USE LEVEL		A B G A B P A	
			A B G A B P A	
7	FILE PADS		A B G A B P A	
			A B G A B P A	
8	PLACE FOUNDATION TO EQUIPMENT		A B G A B P A	
			A B G A B P A	
9	POSITION BOLTS (CODE 1005.03)		A B G A B P A	
			A B G A B P A	
10	TAP BOLTS	7	A ₃ B ₆ G ₃ (M ₃ X ₀ I ₀ A ₃)	(125) 2 1
			A B G M X I A	
			A B G M X I A	
11	BOLT-UP (CODE 1005.04) 3/4" BOLT		A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
		1	A ₃ B ₆ G ₃ A ₃ B ₆ P ₁ A ₀ (M ₃ X ₀ I ₀ A ₃)	(11) 8 2
		4	A ₁ B ₀ G ₁ A ₃ B ₆ P ₁ A ₀ (M ₃ X ₀ I ₀ A ₃)	(11) 2
		6	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ (T ₃) A ₀ B ₀ P ₀ A ₀	20
		10	A ₁ B ₀ G ₁ A ₃ B ₆ P ₁ A ₀ (M ₃ X ₀ I ₀ A ₃)	(11) 2
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
		2	(838)	(11) 2 1
		3	(410)	(11) 2
		9	(410)	(11) 2
		11	(838)	(11) 2 1
TIME =				246,0

INGALLS Shipbuilding	MOST - calculation		CODE 3005.10		
			DATE 6/26/84		
	BOAT HANDLING WINCH INSTALLATION		SIGN. TLC		
			PAGE 10-134		
ACTIVITY REMOVE TEMPORARY BOLTS					
CONDITIONS INTEGRATION AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GANTRY LANDS WINCH AND FOUNDATION ASSEMBLY IN POSITION	1	A B G A B P A		0
		2	A B G A B P A		0
2	SHIP FITTER TACK WELDS WINCH INTO POSITION	3	A B G A B P A		0
		8	A B G A B P A		0
3	PRODUCTION WELDER FINISH WELDS FOUNDATION	9	A B G A B P A		0
		10	A B G A B P A		0
4	SET-UP TO UNBOLT (CODE 1005.02)		A B G A B P A		
5	UNBOLT BOLTS (CODE 1005.04) - 3/4" BOLT		A B G A B P A		
			A B G A B P A		
6	TAP BOLT (INCLUDES TRAVEL)		A B G A B P A		
			A B G A B P A		
7	REMOVE BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
8	GANTRY REMOVES WINCH		A B G A B P A		
			A B G A B P A		
9	PAINTER PAINTS FOUNDATION		A B G A B P A		
			A B G A B P A		
10	GANTRY REPLACES WINCH		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		6	A B G A B P A (16) A B P A (11)		3070
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
		4		970	970
		5		838	11 9218
		7		410	11 4510
TIME =					17,768

INGALLS Shipbuilding		MOST - calculation						CODE 3005.11		
								DATE 6/26/84		
								SIGN. TLC		
BOAT HANDLING WINCH INSTALLATION								PAGE 10-135		
ACTIVITY INSTALL PERMANENT BOLTS										
CONDITIONS INTEGRATION AREA										
NO.	METHOD	NO.	SEQUENCE MODEL						FR	
1	SET-UP TO BOLT-UP (C CODE 1005.02)		A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
2	POSITION BOLT (C CODE 1005.03)		A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
3	TAP BOLT (INCLUDES TRAVEL)		A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
4	BOLT-UP (C CODE 1005.05) - 3/4" BOLT		A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	M	X	I	A	
			A	B	G	M	X	I	A	
			A	B	G	M	X	I	A	
			A	B	G	M	X	I	A	
			A	B	G	M	X	I	A	
			A	B	G	M	X	I	A	
		3	A ³ B ⁶ G ³ A ⁶ B ³ P ³ A ³ F ⁶ /3D ¹ D	(11)						3
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
			A	B	G	A	B	P	A	
		1	970							
		2	410						11	
		4	1215						11	
TIME =								21, 80		

INGALLS Shipbuilding	MOST - calculation					CODE	3006.01
						DATE	5/9/84
	VANEAXIAL FAN INSTALLATION					SIGN.	TLC
						PAGE	10-136
ACTIVITY JOB PREPARATION							
CONDITIONS ASSEMBLY AREA							
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU		
1	SIMPLE INITIAL JOB PREPARATION (CODE 1001.11)		A B G A B P A				
			A B G A B P A				
2	OBTAIN BOLTS FROM FREE STOCK (CODE 1001.121)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
		1	12050			12,050	
		2	15417			15,417	
TIME =						27,467	

INGALLS Shipbuilding	MOST - calculation		CODE	3006.02
			DATE	5/9/84
			SIGN.	TLC
			PAGE	10-137
<div style="display: flex; justify-content: space-between;"> ACTIVITY AREAL TRAVEL VANEAXIAL FAN INSTALLATION </div>				
<div style="display: flex; justify-content: space-between;"> CONDITIONS ASSEMBLY AREA </div>				
NO.	METHOD	NO.	SEQUENCE MODEL	FR
1	FROM TOOL BOX TO ASSEMBLY 102 LADDER (CODE 1002.19) RETURN	3	A ₀ B ₀ G ₀ A ₂₄ B ₀ P ₁ A ₂₄	
			A B G A B P A	
2	FROM ASSY. 102 LADDER TO 2ND PLATFORM DECK EDGE RETURN		A B G A B P A	
			A B G A B P A	
3	FROM 2ND PLATFORM DECK EDGE TO SIDE SHELL RETURN		A B G A B P A	
			A B G A B P A	
4	FROM TOOL ROOM TO FREE STOCK RETURN (CODE 1002.17)		A B G A B P A	
			A B G A B P A	
5	BODY MOTIONS FOR ELEMENT NO. 2		A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G A B P A	
			A B G A B P A	
		5	A ₀ B ₁₆ G ₀ M ₀ X ₀ I ₀ A ₀	
		2	(A ₁ B ₀ G ₁ M ₃) X ₀ I ₀ A ₀ (20) 2	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
		1	3000	2
		4	1960	2
TIME =				12,5

INGALLS Shipbuilding	MOST - calculation		CODE 3006.03		
	VANEAXIAL FAN INSTALLATION		DATE 5/9/84		
			SIGN. TLC		
			PAGE 10-138		
ACTIVITY REMOVE TEMPORARY MOUNTS					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SET-UP TO BOLT UP	4	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	3	90
		5	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	3	90
	CODE 1005.02	6	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	3	90
2.0	TURN BOLT (CODE 1005.04) - 1/2" BOLT	7	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	3	90
2.1	TURN BOLT (CODE 1005.04) - 5/8" BOLT	8	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	3	90
3	REMOVE BOLT (CODE 1005.03)	9	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀		0
		10	A ₀ B ₀ G ₁ A ₀ B ₀ P ₁ A ₀	4	80
4	MOVE FROM TOOL BAG TO 1ST		A B G A B P A		
	1st MOUNT		A B G A B P A		
			A B G A B P A		
5	MOVE FROM 1ST MOUNT		A B G A B P A		
			A B G A B P A		
	TO 2ND MOUNT		A B G A B P A		
			A B G A B P A		
6	MOVE FROM 2ND MOUNT		A B G A B P A		
			A B G A B P A		
	TO 3RD MOUNT		A B G M X I A		
			A B G M X I A		
7	MOVE FROM 3RD MOUNT TO		A B G M X I A		
	4th MOUNT		A B G M X I A		
			A B G M X I A		
8	MOVE FROM 4th MOUNT TO		A B G M X I A		
	TOOL BAG		A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
9	RIGGERS REMOVE FAN FROM		A B G A B P A B P A		
	FOUNDATION		A B G A B P A B P A		
			A B G A B P A B P A		
10	REMOVE TEMPORARY MOUNTS		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1		970	970
		2.0		559	8 4472
		2.1		708	4 2832
		3		410	112 4,920
TIME =					13,724

INGALLS Shipbuilding	MOST - calculation		CODE 3006.04	
			DATE 5/9/84	
	VANEAXIAL FAN INSTALLATION		SIGN. TLC	
			PAGE 10-139	
ACTIVITY REMOVE COVERS AND BRACKETS				
CONDITIONS ASSEMBLY AREA				
NO.	METHOD	NO.	SEQUENCE MODEL	FR
1	SET-UP TO BOLT-UP (CODE 1005.01)	4	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	
		6	A ₃ B ₆ G ₃ A ₃ B ₀ P ₃ A ₀	
2	TURN BOLT (CODE 1005.06) - 1/2" BOLTS	7	A ₃ B ₆ G ₃ A ₃ B ₀ P ₀ A	
		10	A ₃ B ₀ G ₃ A ₃ B ₀ P ₁ A ₀	3
3	REMOVE BOLT (CODE 1005.03)	11	A B G A B P A	
		5	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	
4	MOVE FROM TOOL BAG TO MOUNT NO. 1	8	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀	
		9	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ A ₃	
5	MOVE FROM MOUNT NO. 1 TO MOUNT NO. 2		A B G A B P A	
			A B G A B P A	
6	TURN FAN UPSIDE DOWN		A B G A B P A	
			A B G A B P A	
7	MOVE FROM MOUNT NO. 2 TO MOUNT NO. 3		A B G A B P A	
			A B G A B P A	
8	MOVE FROM MOUNT NO. 3 TO MOUNT NO. 4		A B G A B P A	
			A B G A B P A	
9	MOVE FROM MOUNT NO. 4 TO TOOL BAG		A B G A B P A	
			A B G A B P A	
10	TAKE BRACKETS & COVERS TO TOOL BAG		A B G M X I A	
			A B G M X I A	
11	PAINTER PAINTS BRACKETS AND FOUNDATION		A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G M X I A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
			A B G A B P A B P A	
		1	860	
		2	953	16 15
		3	410	16 6
TIME -				23, 41E

INGALLS Shipbuilding	MOST - calculation		CODE		
			3006.05		
	VANEAXIAL FAN INSTALLATION		DATE 5/9/84		
			SIGN. TLC		
		PAGE 10-140			
ACTIVITY INSTALL COVERS AND BRACKETS					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET BRACKETS & COVERS	1	A ₃ B ₀ G ₃ A ₃ B ₀ P ₃ A ₀	3	360
		2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	6	360
2	PLACE BRACKETS & COVERS IN POSITION	5	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀		30
		6	A ₃ B ₆ G ₃ A ₃ B ₀ P ₃ A ₀		180
3	POSITION BOLT (CODE 1005.03)	7	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀		30
		8	A ₀ B ₀ G ₀ A ₃ B ₀ P ₀ A ₀		30
4	TURN BOLT (CODE 1005.06) - 1/2" BOLT	9	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ A ₃		30
			A B G A B P A		
5	TRAVEL FROM MOUNT NO.1 TO MOUNT NO.2		A B G A B P A		
			A B G A B P A		
6	TURN FAN UPSIDE DOWN		A B G A B P A		
			A B G A B P A		
7	TRAVEL FROM MOUNT NO.2 TO MOUNT NO.3		A B G A B P A		
			A B G A B P A		
8	TRAVEL FROM MOUNT NO.3 TO MOUNT NO.4		A B G A B P A		
			A B G A B P A		
9	TRAVEL FROM MOUNT NO.4 TO TOOL BAG AREA		A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3		410	16 6560
		4		953	16 15248
TIME =					22,828

INGALLS Shipbuilding	MOST - calculation		CODE 3006.07		
	VANEAXIAL FAN INSTALLATION		DATE 5/9/84		
			SIGN. TLC		
			PAGE 10-142		
ACTIVITY BOLT FAN AND BRACKET ASSEMBLY TO RESILIENT MOUNTS					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	RIGGERS PLACE FAN AND BRACKET ASSEMBLY ON RESILIENT MOUNTS	1	A B G A B P A		0
		5	A ₂ B ₂ G ₂ (A ₃ B ₆ P ₂) A ₃ (2)		240
2	SET-UP TO BOLT-UP (CODE 1005.02)		A B G A B P A		
3	POSITION BOLT (CODE 1005.03)		A B G A B P A		
4	TURN BOLT (CODE 1005.05) - 5/8" BOLTS		A B G A B P A		
5	MOVE TO ALL BOLTING LOCATIONS		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		2	970		970
		3	410	4	1640
		4	1026	4	4104
TIME =					6,954

[illegible]

INGALLS Shipbuilding	MOST - calculation		CODE 3007.02		
	SEWAGE PUMP INSTALLATION		DATE 6/14/84		
			SIGN. TLC		
			PAGE 10-144		
ACTIVITY AREAL TRAVEL					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	FROM TOOL BOX TO ASSEMBLY 102 LADDER (CODE 1002.19) & RETURN	3	A ₀ B ₀ G ₀ A ₂₄ B ₀ P ₀ A ₂₄		480
		5	A ₆ B ₀ G ₀ A ₆ B ₀ P ₀ A ₀		120
2	FROM ASSY. 102 LADDER TO 2ND PLATFORM DECK EDGE & RETURN		A B G A B P A		
			A B G A B P A		
3	FROM DECK EDGE TO PUMP ROOM NO. 1 LADDER & RETURN		A B G A B P A		
			A B G A B P A		
4	DESCEND LADDER & ASCEND LADDER		A B G A B P A		
			A B G A B P A		
5	FROM LADDER TO FOUNDATION & RETURN		A B G A B P A		
			A B G A B P A		
6	FROM TOOL BOX TO FREE STOCK (CODE 1002.17)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
		2	A ₀ B ₁₆ G ₀ M ₀ X ₀ I ₀ A ₀	2	320
		2	(A ₁ B ₀ G ₁ M ₃)X ₀ I ₀ A ₀	(20)2	2000
		4	A ₀ B ₁₆ G ₀ M ₀ X ₀ I ₀ A ₀	2	320
		4	(A ₁ B ₀ G ₁ M ₃)X ₀ I ₀ A ₀	(10)2	1000
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	3000	2	6000
		6	1960	2	3920
TIME =					14,160

INGALLS Shipbuilding	MOST - calculation		CODE 3007.04		
	SEWAGE PUMP INSTALLATION		DATE 6/14/84		
			SIGN. TLC		
			PAGE 10-146		
ACTIVITY LAYOUT & DRILL HOLES IN FOUNDATION					
CONDITIONS A S S E M B L Y A R E A					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	MANUFACTURE TEMPLATE (CODE 1003.30)		A B G A B P A		
			A B G A B P A		
2	LAYOUT EACH HOLE (CODE 1003.20)		A B G A B P A		
			A B G A B P A		
3	POSITION DRILL (CODE 1004.11)		A B G A B P A		
			A B G A B P A		
4	USE SAFETY CHAIN (CODE 1004.12)		A B G A B P A		
			A B G A B P A		
5	PLUG IN EXTENSION CORD (CODE 1004.13)		A B G A B P A		
			A B G A B P A		
6	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A		
			A B G A B P A		
7	HAND FEED DRILL BIT TO & FROM WORK (CODE 1004.15)		A B G A B P A		
			A B G A B P A		
8	PROCESS TIME MATERIAL CODE 0013 (5/8" DIA @ 1/4" DEPTH)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		8	149	8	1 192
			1236	8	9.888
		2	323	8	2.584
		3	740	8	5.920
		4	940	8	7.520
		5	2960		2 960
		6	2400		2.400
		7	530	8	4.240
TIME =					36,704

INGALLS Shipbuilding	MOST - calculation		CODE 3007.05		
	SEWAGE PUMP INSTALLATION		DATE 6/14/84		
			SIGN. T.L.C.		
PAGE 15-147					
ACTIVITY INSTALL PERMANENT MOUNTS					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TML
1	RIGGERS REMOVE PUMP FROM FOUNDATION	1	A B G A B P A		
		2	A B G A B P A		
		3	A B G A B P A		
		5	A ₁ B ₆ G ₁ A ₁ B ₆ P ₁ A ₃	4	524
2	NOT USED	8	A ₃ B ₆ G ₀ (A ₃) B ₀ P ₀ A ₃	(4)	2
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
3	PAINTER PAINTS FOUNDATION		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
4	SET-UP FOR BOLTING (CODE 1005.02)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
5	PLACE RESILIENT MOUNT IN POSITION		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
6	POSITION BOLT-5/8" (CODE 1005.03)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
7	POSITION BOLT-3/4" (CODE 1005.03)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
8	TRAVEL		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		970		9	
		410	8	3,28	
		410	4	1,640	
TIME =				6,650	

INGALLS Shipbuilding	MOST - calculation	CODE <div style="text-align: right; font-weight: bold;">3008.02</div>
		DATE <div style="text-align: right;">8 - 24 - 84</div>
	BRIDGE CRANE AND RAILS INSTALLATION	SIGN. F WM PAGE 10-150

ACTIVITY AREA TRAVEL					
CONDITIONS WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	FROM TOOL BOX TO TOOL ROOM OR RETURN (450FT)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
2	FROM TOOL BOX TO STAIRS, 01 LEVEL MIDSHIPS (350 FT)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
3	FROM STAIRS TO SCAFFOLDING ABOVE HANGER DECK OR RETURN (388 FT)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G A B P A		
4	FROM STAIRS TO FREE STOCK OR RETURN (300 FT)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A R P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	3300	2	6600
		2	2450	4	9800
		3	2700	6	16,200
		4	2200	2	4400
TIME =				37,000	

[illegible]

INGALLS Shipbuilding	MOST - calculation		CODE 3008.04		
	BRIDGE CRANE AND RAILS INSTALLATION		DATE 8-24-84		
			SIGN. FWM		
			PAGE 10-152		
ACTIVITY LAYOUT & DRILL BEAM					
CONDITIONS WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
		7	A 0 B 0 G 0 A 1/6 B 3/2 P 0 A 0	4	1920
1	LAYOUT TO DRILL WITH TEMPLATE		A B G A B P A		
	(CODE 1003.20)		A B G A B P A		
			A B G A B P A		
2	PLUG IN EXTENSION (CODE 1004.13)		A B G A B P A		
			A B G A B P A		
3	CHANGE DRILL BITS (CODE 1004.4)		A B G A B P A		
			A B G A B P A		
4	HANDFEED DRILL BIT TO & FROM		A B G A B P A		
	WORKPIECE (CODE 1004.21)		A B G A B P A		
			A B G A B P A		
5	PROCESS TIME TO DRILL 1/8" DIA.		A B G A B P A		
	HOLE (MAT'L & CONDITION CODE		A B G A B P A		
	0187 @ 1" DEPTH)		A B G A B P A		
6	PROCESS TIME TO DRILL 2 1/32"		A B G M X I A		
	DIA. HOLE (MAT'L & CONDITION		A B G M X I A		
	CODE 0187 @ 1" DEPTH)		A B G M X I A		
7	MOVE WITH EQUIP TO EACH		A B G M X I A		
	LOCATION		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	323	48	15,504
		2	2960		2960
		3	2400	4	9600
		4	110	96	10560
		5	75	48	3600
		6	100	48	4800
TIME =					48,944

[illegible]

INGALLS Shipbuilding	MOST - calculation		CODE	
	BRIDGE CRANE AND RAILS INSTALLATION		3008.07	
			DATE 8-24-84	
		SIGN. FWM		PAGE 10-155

ACTIVITY LAYOUT & DRILL RAIL					
CONDITIONS WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	LAYOUT TO DRILL WITH TEMPLATE (CODE 1003.20)	7	A ₀ B ₀ G ₀ A ₁₆ B ₃₂ P ₀ A ₀ A B G A B P A A B G A B P A A B G A B P A A B G A B P A	4	1920
2	PLUG IN EXTENSION (CODE 1004.13)		A B G A B P A A B G A B P A		
3	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A A B G A B P A		
4	HANDFEED DRILL BIT TO 1/4" FROM WORKPIECE (CODE 1004.21)		A B G A B P A A B G A B P A A B G A B P A		
5	PROCESS TIME TO DRILL 1/8" DIA HOLE (MAT'L & COND CODE 0013 @ 1/2" DEPTH)		A B G A B P A A B G A B P A A B G A B P A A B G M X I A		
6	PROCESS TIME TO DRILL 3/4" DIA HOLE (MAT'L & COND CODE 0013 @ 1/2" DEPTH)		A B G M X I A A B G M X I A A B G M X I A A B G M X I A		
7	MOVE WITH EQUIP TO EACH LOCATION		A B G M X I A A B G M X I A A B G A B P A B P A A B G A B P A B P A A B G A B P A B P A A B G A B P A B P A A B G A B P A B P A A B G A B P A B P A A B G A B P A B P A A B G A B P A B P A A B G A B P A B P A		
		1	(323)	(24)2	15.504
		2	2960	2	592
		3	(2400)	(2)2	9600
		4	(110)	(48)2	10.560
		5	(122)	(24)2	588
		6	(247)	(24)2	11.808
TIME = 61.21'					

INGALLS
Shipbuilding

MOST - calculation

CODE

3008.09

DATE

8-24-84

SIGN. FWM

BRIDGE CRANE AND RAILS INSTALLATION

PAGE 10-157

ACTIVITY

REPOSITION RAIL

CONDITIONS

WETDOCK AREA

NO.	METHOD	NO.	SEQUENCE MODEL	FR	TML
		5	(A, B ₀ G ₃ A, B ₀ P ₃ A ₁)	(2)4	720
1	LIFT WITH CHAINFALL	8	A, B ₀ G, A, B ₀ P ₆ A ₀	12	108
		14	(A, B ₀ G, A, B ₀ P, A ₀)	(2)4	360
2	ROLL RAIL OVER		A B G A B P A		
			A B G A B P A		
3	LIFT RAIL TO POSITION		A B G A B P A		
			A B G A B P A		
4	ADJUST LENGTHWISE		A B G A B P A		
			A B G A B P A		
5	PLACE WEDGES		A B G A B P A		
			A B G A B P A		
6	DRIVE WEDGES		A B G A B P A		
			A B G A B P A		
7	MEASURE POSITION		A B G A B P A		
			A B G A B P A		
8	PLACE PADS		A B G A B P A		
			A B G A B P A		
9	SET UP TO BOLT (CODE 1005.02)		A B G A B P A		
		1	A ₃ B ₃₂ (G ₁ M ₃) X ₀ I ₀ A ₀	(30)4	6200
10	POSITION BOLT (CODE 1005.03)	2	A ₃ B ₆ G ₃ M ₃ X ₀ I ₀ A ₀	4	600
		3	A ₃ B ₀ (G ₁ M ₃) X ₀ I ₀ A ₀	(10)4	172
11	PULL TIGHT	4	(A ₃ B ₆ G ₃ M ₃ X ₀ I ₆) A ₀	(2)4	1680
		11	A ₃ B ₀ (G ₁ M ₃) X ₀ I ₀ A ₀	(2)4	440
12	TURN BOLT 5/8" (CODE 1005.04)		A B G M X I A		
			A B G M X I A		
13	RELEASE WEDGES		A B G M X I A		
		6	(A, B ₀ G ₃ A, B ₀ P, F ₁₀ A, B ₀ P, A ₀)	(4)4	288
14	RETRIEVE WEDGES	7	(A, B ₀ G, A, B ₀ P, M ₁₆ A, B ₀ P, A ₀)	(2)4	256
		13	A, B ₀ G, A, B ₀ P, F ₁₀ A, B ₀ P, A ₀	(2)4	1080
15	MEASURE FOR LEVEL & SPACING	15	A, B ₀ G, A, B ₀ P, A ₃ M ₃ A, B ₀ P, A ₀	(11)3	13,980
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		9		970	970
		10		(410)	(2)24 19,680
		12		(708)	(2)24 33,984

TIME =

87,894

INGALLS Shipbuilding		MOST - calculation		CODE 3008.10	
		BRIDGE CRANE AND RAILS INSTALLATION		DATE 8-24-84	
				SIGN. FWM	
				PAGE 10-158	
ACTIVITY POSITION, WELD, & PAINT					
CONDITIONS WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SET UP TO UNBOLT RAIL	7	A ₈ B ₆ G ₁ A ₃ B ₀ P ₁ A ₀	2	3400
	(CODE 1005.02)	14	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	6	240
		11	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	2	120
		12	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁	4	280
2	TURN BOLT 5/8" (CODE 1005.04)	15	A ₆ B ₆ G ₃ A ₆ B ₁₆ P ₁ A ₀		380
		16	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	2	80
3	REMOVE BOLT (CODE 1005.03)	18	A ₁ B ₀ G ₃ A ₆ B ₁₆ P ₁ A ₀		270
			A B G A B P A		
4	LOWER RAIL		A B G A B P A		
			A B G A B P A		
5	POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
6	TURN BOLT 5/8" (CODE 1005.04)		A B G A B P A		
			A B G A B P A		
7	BORROW OR RETURN AIR LINE		A B G A B P A		
			A B G A B P A		
8	ATTACH OR DETACH GRINDER		A B G A B P A		
9	GRIND OFF TABS	4	A ₃ B ₃₂ (G ₁ M ₃) X ₀ I ₀ A ₀	(40) 4	7800
		9	(A ₁ B ₀ G ₁ M ₁ X ₁₇₃ I ₀ A ₀)	(2) 4	14,080
10	GRIND WELD PREP	10	A ₁ B ₀ G ₁ M ₁ X ₁₀₀ I ₀ A ₀	12	36,360
		13	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	64	1920
11	PLACE SHIELD GRIND OR WELD	17	A ₁ B ₀ G ₁ M ₁ (X ₁₇₃) I ₀ A ₀	(52) 12	52,680
			A B G M X I A		
12	PLACE GLOVES GRIND OR WELD		A B G M X I A		
			A B G M X I A		
13	OPEN OR CLOSE SHIELD	8	A ₃ B ₆ G ₁ A ₃ B ₀ P ₃ F ₁₆ A ₀ B ₀ P ₀ A ₀	2	640
			A B G A B P A B P A		
			A B G A B P A B P A		
	GRIND OR WELD		A B G A B P A B P A		
			A B G A B P A B P A		
14	REMOVE SHIELD OR GLOVES		A B G A B P A B P A		
			A B G A B P A B P A		
	GRIND OR WELD		A B G A B P A B P A		
			A B G A B P A B P A		
15	GET WELDING EQUIP		A B G A B P A B P A		
			A B G A B P A B P A		
16	GET ASIDE HANDLE		A B G A B P A B P A		
			A B G A B P A B P A		
17	WELD PADS	1		970	1 970
		2		(708)	(2) 24 33,984
18	RETURN WELDING EQUIP	3		(410)	(2) 24 19,680
		5		(410)	(2) 24 19,680
		6		(708)	(2) 24 33,984
TIME =					226,548

INGALLS Shipbuilding	MOST - calculation		CODE		
			3008.11		
	BRIDGE CRANE AND RAILS INSTALLATION		DATE		
			8-24-84		
		SIGN. FWM			
		PAGE 10-159			
ACTIVITY					
INSTALL STOPS					
CONDITIONS					
WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SET UP TO UNBOLT (CODE 1005.02)	4	A B G A B P A		0
2	TURN BOLT 5/8" (CODE 1005.04)	13	A ₀ B ₀ G ₀ A ₁₆ B ₃₂ P ₀ A ₀	8	384
3	REMOVE BOLT (CODE 1005.03)		A B G A B P A		
4	SERVICE PAINTER PAINT PADS		A B G A B P A		
5	LAYOUT TO DRILL WITHOUT		A B G A B P A		
	TEMPLATE (CODE 1003.10)		A B G A B P A		
6	PLUG IN EXTENSION (CODE 1004.13)		A B G A B P A		
7	CHANGE DRILL BITS (CODE 1004.14)		A B G A B P A		
8	HANDFEED DRILL BIT TO 5' FROM		A B G A B P A		
	WORKPIECE (CODE 1004.21)		A B G M X I A		
9	PROCESS TIME TO DRILL 1/4" DIA		A B G M X I A		
	HOLE (MAT'L & CONDITION CODE		A B G M X I A		
	OD13 @ 1/2" DEPTH)		A B G M X I A		
10	SET UP TO BOLT STOP (CODE 1005.02)		A B G A B P A B P A		
11	POSITION BOLT (CODE 1005.03)		A B G A B P A B P A		
12	TURN BOLT 1/4" (CODE 1005.05)		A B G A B P A B P A		
13	MOVE WITH EQUIP TO EACH	1		970	97
	LOCATION	2		(708)	(2)24 33,984
		3		(410)	(2)24 19,68
		5		1390	8 1112
		6		2960	2960
		7		2400	2400
		8		110	8 88
		9		157	8 1256
		10		970	970
		11		410	8 328
		12		420	8 3360
TIME =					9470

INGALLS Shipbuilding	MOST - calculation		CODE			
			3008.12			
	BRIDGE CRANE AND RAILS INSTALLATION		DATE			
			8-24-84			
		SIGN.				
		FWM				
		PAGE				
		10-160				
ACTIVITY INSTALL BRIDGE CRANE						
CONDITIONS WETDOCK AREA						
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU	
1	RAISE RAIL	7	A B G A B P A		0	
		8	A B G A B P A		0	
2	ADJUST LENGTHWISE	11	A B G A B P A		0	
		16	A B G A B P A		0	
3	SET UP TO BOLT (CODE 1005.01)	12	A ₁ B ₀ G ₁ A ₁ B ₀ P ₆ A ₁	2	200	
		13	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	2	120	
4	POSITION BOLT (CODE 1005.03)	14	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁	2	140	
		16	A B G A B P A		0	
5	TURN BOLT 5/8" (CODE 1005.07)	20	A ₀ B ₀ G ₀ A ₆ B ₃₂ P ₀ A ₀	4	1920	
			A B G A B P A			
6	MEASURE FOR LEVEL & SPACING		A B G A B P A			
			A B G A B P A			
7	CARPENTERS OPEN SCAFFOLDING		A B G A B P A			
			A B G A B P A			
8	RIGGERS POSITION BRIDGE CRANE		A B G A B P A			
			A B G A B P A			
9	ROTATE COGS TO ALIGN		A B G A B P A			
			A B G A B P A			
10	PUSH BRIDGE ONTO RAILS	1	A ₃ B ₃₂ (G ₁ M ₃) X ₀ I ₀ A ₀	40/2	3900	
		2	A ₃ B ₆ G ₃ M ₃ X ₀ I ₃ A ₀	2	360	
11	RIGGERS POSITION CROSS RAIL	9	A ₁ B ₀ G ₁ M ₁ X ₀ I ₁ A ₀	2	80	
		10	A ₁ B ₀ G ₃ M ₃ X ₀ I ₀ A ₀		70	
12	INSERT HINGE PINS		A B G M X I A			
			A B G M X I A			
13	PLACE WASHERS		A B G M X I A			
			A B G M X I A			
14	INSERT COTTER PINS	6	A ₁ B ₀ G ₁ A ₀ (B ₆ P ₁ A ₃ M ₃₂) A ₁ B ₀ P ₁ A ₀	(15)	6340	
		15	A ₁ B ₀ G ₃ A ₁ (B ₀ P ₃ C ₆) A ₁ B ₀ P ₁ A ₀	(4)	430	
15	BEND ENDS		A B G A B P A B P A			
			A B G A B P A B P A			
16	RIGGERS POSITION HOIST		A B G A B P A B P A			
			A B G A B P A B P A			
17	SET UP TO BOLT (CODE 1005.02)		A B G A B P A B P A			
			A B G A B P A B P A			
18	POSITION BOLTS (CODE 1005.03)		A B G A B P A B P A			
			A B G A B P A B P A			
19	TURN BOLT 1/2" (CODE 1005.05)		A B G A B P A B P A			
			A B G A B P A B P A			
20	MOVE WITH EQUIP TO EACH	3		860	860	
		4		(410)	(2)14	11,480
	LOCATION	5		(2052)	(2)14	57,456
		17		970		970
		18		410	8	3280
		19		810	8	6480
TIME =					94,086	

INGALLS Shipbuilding	MOST - calculation		CODE 3008.13		
			DATE 8-24-84		
	BRIDGE CRANE AND RAILS INSTALLATION		SIGN. FWM		
			PAGE 10-161		
ACTIVITY FINAL INSTALL RAIL					
CONDITIONS WET DOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TM
1	RAISE RAIL	7	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	6	360
		9	A ₀ B ₀ G ₀ A _{1/6} B ₃₂ P ₀ A ₀	8	38
2	ADJUST LENGTHWISE		A B G A B P A		
			A B G A B P A		
3	SET UP TO BOLT (CODE 1005.01)		A B G A B P A		
			A B G A B P A		
4	POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
5	TURN BOLT 5/8" (CODE 1005.07)		A B G A B P A		
			A B G A B P A		
6	MEASURE FOR LEVEL & SPACING		A B G A B P A		
			A B G A B P A		
7	PLACE LINKS & RIVETS		A B G A B P A		
			A B G A B P A		
8	HAMMER RIVETS		A B G A B P A		
			A B G A B P A		
9	MOVE WITH EQUIP TO EACH.		A B G A B P A		
			A B G A B P A		
	LOCATION	1	A ₃ B ₃₂ (G ₁ M ₃) X ₀ I ₀ A ₀	(40) 2	35
		2	A ₃ B ₆ G ₃ M ₃ X ₀ I ₃ A ₀	2	36
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		6	A ₁ B ₀ G ₁ A ₀ (B ₆ P ₁ A ₃ M ₃) X ₁ B ₀ P ₁ A ₀	(15)	63
		8	A ₁ B ₀ G ₃ A ₀ (B ₃ P ₁ A ₁ F ₃) A ₁ B ₀ P ₁ A ₀	(4)	3
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3		860	8
		4		(410)	(2) 10 820
		5		(2052)	(2) 10 41
TIME =					65,280

INGALLS Shipbuilding	MOST - calculation		CODE 3009.03		
	CONVECTION OVEN INSTALLATION		DATE 8-27-84		
			SIGN. FWM		
			PAGE 10-164		
ACTIVITY LAYOUT & DRILL PADS					
CONDITIONS WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	LAYOUT TO DRILL WITHOUT	6	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀)	8(2)	640
	TEMPLATE (CODE 1003.10)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
2	PLUG IN EXTENSION CORD		A B G A B P A		
	(CODE 1004.13)		A B G A B P A		
			A B G A B P A		
3	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A		
4	HAND FEED DRILL BIT TO & FROM		A B G A B P A		
	WORK PIECE (CODE 1004.15)		A B G A B P A		
			A B G A B P A		
5	OPEN VISE		A B G A B P A		
			A B G A B P A		
6	PLACE OR REMOVE PAD IN VISE		A B G A B P A		
			A B G A B P A		
7	TIGHTEN OR LOOSEN VISE	5	A ₁ B ₀ G ₁ M ₅ X ₀ I ₀ A ₀		560
		7	(A ₁ B ₀ G ₁ M ₆) X ₀ I ₀ A ₀	8(2)	1280
			A B G M X I A		
8	PROCESS TIME TO DRILL 1/8" DIA		A B G M X I A		
	HOLE (MAT'L & CONDITION CODE		A B G M X I A		
	0132 @ 1" DEPTH)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
9	PROCESS TIME TO DRILL 9/16" DIA		A B G A B P A B P A		
	HOLE (MAT'L & CONDITION CODE		A B G A B P A B P A		
	0132 @ 1" DEPTH)		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1		1390	4 5560
		2		2960	2960
		3		2400	2 4800
		4		530	8 4240
		8		629	4 2516
		9		1117	4 4468
TIME =				27,024	

INGALLS Shipbuilding	MOST - calculation		CODE	3009.04	
			DATE	8 - 27 - 84	
			SIGN.	F W M	
CONVECTION		OVEN INSTALLATION	PAGE 10 - 165		

ACTIVITY TAP & CHECK PADS					
CONDITIONS WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET TOOLS & EQUIP	1	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	2	120
		2	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀)	(4)2	320
		4	(A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀)	(3)4	72
2	PLACE OR REMOVE PAD IN VISE		A B G A B P A		
			A B G A B P A		
3	TIGHTEN OR LOOSEN VISE		A B G A B P A		
			A B G A B P A		
4	APPLY CUTTING FLUID		A B G A B P A		
			A B G A B P A		
5	INSERT TAP		A B G A B P A		
			A B G A B P A		
6	CHASE THREADS		A B G A B P A		
			A B G A B P A		
7	WIPE CLEAN		A B G A B P A		
			A B G A B P A		
8	SET UP TO BOLT (CODE 1005.02)		A B G A B P A		
			A B G A B P A		
9	POSITION OR REMOVE BOLT		A B G A B P A		
	(CODE 1005.03)	3	(A ₁ B ₀ G ₁ M ₆) X ₀ I ₀ A ₀	(4)2	64
			A B G M X I A		
			A B G M X I A		
10	TURN 1/2" BOLT (CODE 1005.04)		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ F ₆₇ A ₁ B ₀ P ₁ A ₀	(3)4	9000
		6	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ F ₃₂ A ₁ B ₀ P ₁ A ₀	4	160
		7	A ₁ B ₀ G ₁ A ₀ B ₀ P ₁ A ₁ S ₆ A ₁ B ₀ P ₁ A ₀	(2)4	160
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		8		970	970
		9		410 (2)4	3280
		10		559 (2)4	447
TIME =					22,722

INGALLS Shipbuilding	MOST - calculation					CODE 3009.05	
	CONVECTION OVEN INSTALLATION					DATE 8-27-84	
						SIGN. FWM	
						PAGE 10-166	
ACTIVITY BOLT UP PADS							
CONDITIONS WET DOCK AREA							
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU		
1	WAIT FOR RIGGERS TO TURN	1	A B G A B P A		0		
	OVEN OVER ON SIDE	5	A B G A B P A		0		
			A B G A B P A				
2	SET UP TO BOLT (CODE 1005.02)		A B G A B P A				
			A B G A B P A				
3	POSITION BOLT (CODE 1005.03)		A B G A B P A				
			A B G A B P A				
4	TURN 1/2" BOLT (CODE 1005.05)		A B G A B P A				
			A B G A B P A				
5	WAIT FOR RIGGERS TO RIGHT		A B G A B P A				
	1/4 POSITION OVEN		A B G A B P A				
			A B G A B P A				
6	MEASURE FOR ALIGNMENT		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
		6	A B G A B P A (8) 3400				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
		2	970		970		
		3	410	4	1640		
		4	810	4	3240		
TIME =						9,250	

INGALLS Shipbuilding	MOST - calculation		CODE 30009.06		
	CONVECTION OVEN INSTALLATION		DATE 8-27-84		
			SIGN. FWM		
			PAGE 10-167		
ACTIVITY WELD PADS IN PLACE					
CONDITIONS WET DOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	GET WELDING EQUIP	1	A ₆ B ₆ G ₃ A ₁ B ₀ P ₁ A ₀		170
		2	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀		60
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₁	2	141
2	PLACE SHIELD	4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀		40
		5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	16	960
3	PLACE GLOVES	10	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	3	120
		12	A ₁ B ₀ G ₃ A ₆ B ₆ P ₁ A ₀		170
4	GET & ASIDE WHIP		A B G A B P A		
			A B G A B P A		
5	INSERT WELDING ROD		A B G A B P A		
			A B G A B P A		
6	CLOSE & OPEN SHIELD		A B G A B P A		
			A B G A B P A		
7	TACK WELD PADS		A B G A B P A		
			A B G A B P A		
8	WELD PADS DOWN		A B G A B P A		
			A B G A B P A		
9	RELEASE SPENT RODS		A B G A B P A		
		6	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	64	1920
10	REMOVE SHIELD & GLOVES	7	(A ₃ B ₆ G ₁ M ₀ X ₅ I ₁) I ₀ A ₀	(4) 4	10,240
		9	A ₀ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	16	32
11	CLEAN WELDS		A B G M X I A		
			A B G M X I A		
12	RETURN WELDING EQUIP		A B G M X I A		
			A B G M X I A		
		11	A ₁ B ₀ G ₁ A ₀ (B ₆ P ₁ A ₃ F ₁₀) A ₀ B ₀ P ₀ A ₀	(16)	3220
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		8	PROCESS TIME 17.0 MIN.		28.46
TIME =					45.820

INGALLS Shipbuilding	MOST - calculation	CODE	3010.02
		DATE	8 - 8 - 84
	HOIST AND MONORAIL INSTALLATION	SIGN.	F W M
		PAGE	10-169

ACTIVITY AREA TRAVEL

CONDITIONS WET DOCK AREA

NO.	METHOD	NO.	SEQUENCE MODEL	FR	-TMU
1	FROM TOOL BOX TO TOOL ROOM OR RETURN (450 FT)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
2	FROM TOOL BOX TO STAIRS, OI LEVEL MIDSHIPS (350 FT)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
3	FROM STAIRS TO SCAFFOLDING ABOVE HANGER DECK OR RETURN (388 FT)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
	FROM STAIRS TO FREE STOCK OR RETURN (300 FT)		A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	3300	2	660
			2450	2	4900
		2	2700	4	10,80
		4	2200	2	4,400

TIME = 26,700

INGALLS Shipbuilding		MOST - calculation		CODE <div>3010.03</div>	
				DATE 8-8-84	
				SIGN. F.W.M.	
		HOIST AND MONORAIL INSTALLATION		PAGE 10-170	
ACTIVITY LAYOUT CENTERLINE					
CONDITIONS WET DOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	MEASURE FROM ENDS OF BEAM	4	A ₁ B ₀ G ₁ A ₁₆ B ₃₂ P ₆ A ₀		560
		7	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	2	120
2	MARK MEASUREMENTS	8	A ₃ B ₂₄ G ₀ (A ₁ B ₀ P ₆)A ₀	(4)4	2200
			A B G A B P A		
3	PULL OUT CHALKLINE		A B G A B P A		
			A B G A B P A		
4	PLACE CHALKLINE		A B G A B P A		
			A B G A B P A		
5	SNAP CHALKLINE		A B G A B P A		
			A B G A B P A		
6	REWIND CHALKLINE		A B G A B P A		
			A B G A B P A		
7	GET & RETURN HAMMER & PUNCH		A B G A B P A		
			A B G A B P A		
8	PLACE PUNCH ON MARKS		A B G A B P A		
			A B G A B P A		
9	CENTER PUNCH MARKS		A B G A B P A		
			A B G A B P A		
10	INSPECT MARKS	3	A ₁ B ₀ G ₁ M ₃ X ₀ I ₀ A ₀	12	600
		5	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀		30
		6	A ₁ B ₀ G ₁ M ₁₁₃ X ₀ I ₀ A ₀		1150
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		1	A ₁ B ₀ G ₁ A ₀ (B ₃₂ P ₆ A ₀)A ₀	(2)	1460
		2	A ₁ B ₀ G ₁ A ₀ (B ₀ P ₁ A ₁ R ₁)A ₁ B ₀ P ₁ A ₀	(2)	100
		9	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ F ₆ A ₀ B ₀ P ₀ A ₀	16	1280
		10	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ T ₁ A ₀ B ₀ P ₀ A ₀	16	160
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				7,660	

INGALLS Shipbuilding		MOST - calculation		CODE 3010.07	
				DATE 8-8-84	
				SIGN. FWM	
		HOIST AND MONORAIL INSTALLATION		PAGE 10-174	
ACTIVITY POSITION RAIL, LAYOUT & MEASURE					
CONDITIONS WET DOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	RIGGER HANG CHAIN FALLS	1	A B G A B P A		0
		4	A ₁ B ₀ G ₃ A ₁ B ₀ P ₆ A ₀	2	220
		9	A ₁ B ₀ G ₃ (A ₁ B ₀ P ₃ A ₁)	(2)	140
2	SLIDE RAIL ALONG PLATFORM		A B G A B P A		
			A B G A B P A		
3	PICK UP ONE END		A B G A B P A		
			A B G A B P A		
4	PLACE SLINGS UNDER RAIL		A B G A B P A		
			A B G A B P A		
5	LIFT WITH CHAIN FALL		A B G A B P A		
			A B G A B P A		
6	ROLL RAIL OVER		A B G A B P A		
			A B G A B P A		
7	LIFT RAIL TO POSITION		A B G A B P A		
			A B G A B P A		
8	ADJUST LENGTHWISE		A B G A B P A		
			A B G A B P A		
9	PLACE WEDGES		A B G A B P A		
		2	A ₁ B ₂ G ₃ M ₆ X ₀ I ₀ A ₀		340
10	DRIVE WEDGES	3	A ₁ B ₁ G ₃ M ₃ X ₀ I ₀ A ₀	2	460
		5	A ₃ B ₃ (G ₁ M ₃) X ₀ I ₀ A ₀	(30)	1550
11	MEASURE POSITION	6	A ₃ B ₆ G ₃ M ₃ X ₀ I ₀ A ₀		150
		7	A ₃ B ₀ (G ₁ M ₃) X ₀ I ₀ A ₀	(10)	430
12	PULL TIGHT	8	A ₃ B ₆ G ₃ M ₃ X ₀ I ₆ A ₀	2	420
		12	A ₃ B ₀ (G ₁ M ₃) X ₀ I ₀ A ₀	(2)	110
13	MARK HOLES & EDGES OF PIVOT	16	A ₃ B ₀ (G ₁ M ₃) X ₀ I ₀ A ₀	(40)	1630
	BLOCKS ON RAIL	10	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ F ₁₀ A ₁ B ₀ P ₁ A ₀	4	720
		11	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ M ₁₆ A ₁ B ₀ P ₁ A ₀	2	440
14	MEASURE FOR PAD THICKNESS	13	A ₁ B ₀ G ₁ A ₀ (B ₁₆ P ₁ A ₆ R ₂₈) A ₁ B ₀ P ₁ A ₀	(4)	1920
		14	A ₁ B ₀ G ₁ A ₀ (B ₁₆ P ₁ A ₆ M ₂) A ₁ B ₀ P ₁ A ₀	(4)	2240
15	WRITE DOWN THICKNESS	15	A ₁ B ₀ G ₃ A ₁ B ₀ (P ₁ M ₁₀) A ₁ B ₀ P ₁ A ₀	(4)	510
			A B G A B P A B P A		
			A B G A B P A B P A		
16	LOWER RAIL		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =				11,280	

INGALLS Shipbuilding	MOST - calculation					CODE 30/0.09	
						DATE 8 - 8 - 84	
	HOIST AND MONORAIL INSTALLATION					SIGN. F W M	
						PAGE 10-176	
ACTIVITY LAYOUT & DRILL PADS							
CONDITIONS WET DOCK AREA							
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU		
1	LAYOUT TO DRILL WITH TEMPLATE (CODE 1003.20)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
2	PLUG IN EXTENSION (CODE 1004.13)		A B G A B P A				
			A B G A B P A				
3	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A				
			A B G A B P A				
4	HANDFEED DRILL BIT TO & FROM WORKPIECE (CODE 1004.21)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
5	PROCESS TIME TO DRILL 1/8" DIA HOLE (MAT'L & COND CODE 0187 @ 3/8" DEPTH)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G M X I A				
			A B G M X I A				
6	PROCESS TIME TO DRILL 1/2" DIA HOLE (MAT'L & COND. CODE 0187 @ 3/8" DEPTH)		A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
		1	323	16	5168		
		2	2960		2960		
		3	2400	2	4800		
		4	110	32	3520		
		5	30	16	480		
		6	38	16	608		
TIME=						17, 536	

INGALLS Shipbuilding	MOST - calculation		3010.11		
			DATE 8-8-84		
			SIGN. F W M		
	HOIST AND MONORAIL INSTALLATION		PAGE 10-178		
ACTIVITY					
REPOSITION RAIL					
CONDITIONS					
WET DOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	LIFT WITH CHAIN FALL	5	A, B ₀ G ₃ A, B ₀ P ₃ A,	2	180
		8	A, B ₀ G, A, B ₀ P ₆ A ₀	4	360
2	ROLL RAIL OVER	14	A, B ₀ G, A, B ₀ P, A ₀	2	80
			A B G A B P A		
3	LIFT RAIL TO POSITION		A B G A B P A		
			A B G A B P A		
4	ADJUST LENGTHWISE		A B G A B P A		
			A B G A B P A		
5	PLACE WEDGES		A B G A B P A		
			A B G A B P A		
6	DRIVE WEDGES		A B G A B P A		
			A B G A B P A		
7	MEASURE POSITION		A B G A B P A		
			A B G A B P A		
8	PLACE PADS		A B G A B P A		
			A B G A B P A		
9	SET UP TO BOLT (CODE 1005.02)		A B G A B P A		
			A B G A B P A		
10	POSITION BOLT (CODE 1005.03)	1	A ₃ B ₃₂ (G ₁ M ₃) X ₀ I ₀ A ₀	(30)	1550
		2	A ₃ B ₆ G ₃ M ₃ X ₀ I ₀ A ₀		150
11	PULL TIGHT	3	A ₃ B ₀ (G ₁ M ₃) X ₀ I ₀ A ₀	(10)	430
		4	A ₃ B ₆ G ₃ M ₃ X ₀ I ₆ A ₀	2	420
12	TURN BOLT 1/2" (CODE 1005.04)	11	A ₃ B ₀ (G ₁ M ₃) X ₀ I ₀ A ₀	(2)	110
			A B G M X I A		
13	RELEASE WEDGES		A B G M X I A		
			A B G M X I A		
14	RETRIEVE WEDGES	6	A, B ₀ G ₃ A, B ₀ P, F ₁₀ A, B ₀ P, A ₀	4	720
		7	A, B ₀ G, A, B ₀ P, M ₁₆ A, B ₀ P, A ₀	2	640
15	MEASURE FOR LEVEL	13	A, B ₀ G, A, B ₀ P, F ₁₀ A, B ₀ P, A ₀	(2)	270
		15	A, B ₀ G, A ₀ (B ₆ P, A ₃ M ₃₂) A, B ₀ P, A ₀	(7)	2980
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		9	970		970
		10	410	16	6560
		12	559	16	8944
TIME =					24,364

INGALLS Shipbuilding	MOST - calculation		CODE		
			3010.13		
	HOIST AND MONORAIL INSTALLATION		DATE 8-8-84		
			SIGN. FWM		
		PAGE 10-180			
ACTIVITY					
INSTALL HOIST					
CONDITIONS					
WET DOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
		5	A B G A B P A		0
1	SET UP TO UNBOLT (CODE 1005.02)	6	A B G A B P A		0
2	TURN BOLT 1/2" (CODE 1005.04)	17	A ₀ B ₀ G ₀ A ₁₆ B ₃₂ P ₀ A ₀	4	1920
			A B G A B P A		
3	REMOVE BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
4	LOWER RAIL		A B G A B P A		
			A B G A B P A		
5	SERVICE PAINTER PAINT PADS		A B G A B P A		
			A B G A B P A		
6	RIGGERS POSITION HOIST		A B G A B P A		
			A B G A B P A		
7	ROTATE COG TO ALIGN		A B G A B P A		
			A B G A B P A		
8	PUSH HOIST ONTO RAIL		A B G A B P A		
			A B G A B P A		
9	LAYOUT TO DRILL WITHOUT		A B G A B P A		
		4	A ₃ B ₃₂ (G ₁ M ₃) X ₀ I ₀ A ₀	(20)	1150
	TEMPLATE (CODE 1003.10)	7	A ₁ B ₀ G ₁ M ₁ X ₀ I ₁ A ₀		40
		8	A ₁ B ₀ G ₃ M ₃ X ₀ I ₀ A ₀		70
10	PLUG IN EXTENSION (CODE 1004.13)		A B G M X I A		
			A B G M X I A		
11	CHANGE DRILL BITS (CODE 1004.14)		A B G M X I A		
			A B G M X I A		
12	HANDFEED DRILL BIT TO & FROM		A B G M X I A		
			A B G A B P A B P A		
	WORKPIECE (CODE 1004.21)		A B G A B P A B P A		
			A B G A B P A B P A		
13	PROCESS TIME TO DRILL 1/4" DIA		A B G A B P A B P A		
			A B G A B P A B P A		
	HOLE (MAT'L & CONDITION CODE		A B G A B P A B P A		
			A B G A B P A B P A		
	0013 @ 1/2" DEPTH)	1		970	970
		2		559	16 8944
14	SET UP TO BOLT STOP (CODE 1005.02)	3		410	16 6560
		9		1390	4 5560
15	POSITION BOLT (CODE 1005.03)	10		2960	2960
		11		2400	2400
16	TURN BOLT 1/4" (CODE 1005.05)	12		110	4 440
		13		157	4 628
17	MOVE WITH EQUIP TO EACH	14		970	970
		15		410	4 1640
	LOCATION	16		420	4 1680
TIME =					35,932

INGALLS Shipbuilding	MOST - calculation		CODE		3010.1
			DATE	8-8-84	
	HOIST AND MONORAIL INSTALLATION		SIGN.	FWM	
			PAGE	10-181	
ACTIVITY FINAL INSTALL RAIL					
CONDITIONS WETDOCK AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	
1	RAISE RAIL	7	A ₀ B ₀ G ₀ A ₁₆ B ₃₂ P ₀ A ₀	4	1
			A B G A B P A		
2	ADJUST LENGTHWISE		A B G A B P A		
			A B G A B P A		
3	SET UP TO BOLT (CODE 1005.01)		A B G A B P A		
			A B G A B P A		
4	POSITION BOLT (CODE 1005.03)		A B G A B P A		
			A B G A B P A		
5	TURN BOLT 1/2" (CODE 1005.07)		A B G A B P A		
			A B G A B P A		
6	MEASURE FOR LEVEL		A B G A B P A		
			A B G A B P A		
7	MOVE WITH EQUIP TO EACH		A B G A B P A		
			A B G A B P A		
	LOCATION		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
		1	A ₃ B ₃₂ G ₁ M ₃ X ₀ I ₀ A ₀	(20)	1
		2	A ₃ B ₆ G ₃ M ₃ X ₀ I ₃ A ₀		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		6	A ₁ B ₀ G ₀ A ₀ B ₀ P ₀ A ₀ (6) A ₃ B ₃₂ G ₁ M ₃ X ₀ I ₀ A ₀	(7)	2
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		3		860	
		4		410	16 6
		5		1620	16 2
TIME =					39.5

INGALLS Shipbuilding	MOST - calculation					CODE 3011.01	
	COOLING COIL INSTALLATION					DATE 8/9/89	
						SIGN. FWM/TLC	
						PAGE 10-182	
ACTIVITY JOB PREPARATION							
CONDITIONS ASSEMBLY AREA							
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU		
1	AVERAGE INITIAL JOB PREPARATION (CODE 1001.12)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
2	SECURE PARTS FROM WAREHOUSE (CODE 1001.132)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
3	RETURN TOOLS TO TOOL CRIB (CODE 1001.121)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
4	SIMPLE ADDITIONAL JOB PREPARATION (CODE 1001.21)		A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G A B P A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G M X I A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
			A B G A B P A B P A				
		1		42.001	1	42.001	
		2		11.445	1	11.445	
		3		15.417	1	15.417	
		4		1.180	2	2.360	
TIME =						71,223	

INGALLS Shipbuilding	MOST - calculation		CODE 3011 .02		
			DATE 8/9/84		
	COOLING COIL INSTALLATION		SIGN. FWM/TLC		
			PAGE 10-193		
ACTIVITY AREA TRAVEL					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	FROM TOOL BOX TO MATERIAL		A B G A B P A		
	PILE (800 FT.)		A B G A B P A		
			A B G A B P A		
2	FROM MATERIAL PILE TO		A B G A B P A		
	ASSEMBLY 306 LADDER (125 FT)		A B G A B P A		
			A B G A B P A		
3	UP LADDER INTO COMPARTMENT		A B G A B P A		
	OR RETURN (45 STEPS)		A B G A B P A		
			A B G A B P A		
4	FROM ASSEMBLY 306 LADDER TO		A B G A B P A		
	DRILL PRESS (965 FT)		A B G A B P A		
			A B G A B P A		
5	FROM DRILL PRESS TO FREE STOCK		A B G A B P A		
	(125 FT)		A B G M X I A		
			A B G M X I A		
6	FROM FREE STOCK TO		A B G M X I A		
	ASSEMBLY 306 LADDER (840 FT)		A B G M X I A		
			A B G M X I A		
7	FROM ASSEMBLY 306 LADDER		A B G M X I A		
	TO TOOL BOX (925 FT)		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
8	FROM TOOL BOX TO TOOL		A B G A B P A B P A		
	ROOM OR RETURN (CODE 1002.16)		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		1	5520	3	16560
		2	960	3	2880
		3	810	4	3240
		4	6660	1	6660
		5	960	1	960
		6	5800	1	5800
		7	6390	3	19170
		8	11311	4	45244
TIME =				100,514	

INGALLS Shipbuilding	MOST - calculation		CODE <div style="font-size: 18pt; font-weight: bold;">3011.04</div>		
			DATE <div style="font-size: 18pt; font-weight: bold;">8/9/84</div>		
	COOLING COIL INSTALLATION		SIGN. <div style="font-size: 18pt; font-weight: bold;">FWM/TLC</div>		
			PAGE <div style="font-size: 18pt; font-weight: bold;">10-135</div>		
ACTIVITY <div style="font-size: 18pt; font-weight: bold;">LAYOUT HOLES ON LEGS</div>					
CONDITIONS <div style="font-size: 18pt; font-weight: bold;">ASSEMBLY AREA</div>					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	-TMU
1	GET LEGS OUT OF BAG IN SETS	1	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	3	-180
		2	A ₁ B ₆ G ₃ A ₃ B ₆ P ₁ A ₀		200
2	POSITION COIL	3	A ₁ B ₀ G ₃ A ₃ B ₀ P ₁ A ₀	6	480
		4	A ₁ B ₀ G ₁ A ₃ B ₆ P ₃ A ₀	6	840
3	DISTRIBUTE LEGS	5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₆ A ₀	6	540
		7	A ₀ B ₀ G ₀ A ₁ B ₀ P ₃ A ₀	6	240
4	PLACE SPACER & MOVE TO EACH LEG	8	A ₃ B ₆ G ₃ A ₁ B ₀ P ₁ A ₀	6	840
		9	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	2	80
5	POSITION LEG		A B G A B P A		
			A B G A B P A		
6	SCRIBE HOLES		A B G A B P A		
			A B G A B P A		
7	ASIDE LEG TO CENTER PILE		A B G A B P A		
			A B G A B P A		
8	COLLECT LEGS & PLACE IN BAG		A B G A B P A		
			A B G A B P A		
9	SHOULDER AND UNSHOULDER BAG		A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		6	A ₁ B ₀ G ₁ A ₁ B ₀ (P ₁ A ₀ R ₃) A ₁ B ₀ P ₁ A ₀	(2)6	780
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
TIME =					4,180

INGALLS Shipbuilding		MOST - calculation		CODE 3011.05	
				DATE 8/9/84	
		COOLING COIL INSTALLATION		SIGN. FWM/TLC	
				PAGE 10-186	
ACTIVITY DRILL HOLES ON LEGS					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
1	SHOULDER OR UNSHOULDER TOOL BAG	1	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀	2	80
		2	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	5	300
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀	12	720
2	GET LEG SETS & TOOLS OUT OF BAG	4	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀		40
		6	A ₆₇ B ₀ G ₃ A ₆₇ B ₀ P ₃ A ₁	2	2820
		9	(A ₁ B ₀ G ₃) A ₁ B ₀ P ₆ A ₀	(2)6	900
3	POSITION OR ASIDE EACH LEG	11	A ₀ B ₀ G ₀ A ₁ B ₀ P ₃ A ₀	6	240
			A B G A B P A		
			A B G A B P A		
4	GET & ASIDE HAMMER		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
5	GET PUNCH & PUNCH EACH LEG		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
6	GET CHUCK & PLACE OR RETURN		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
7	TIGHTEN CHUCK IN HOLDER		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
8	CHANGE DRILL BIT (CODE 1004.14)		A B G A B P A		
			A B G A B P A		
			A B G A B P A		
9	SELECT PAIR OF LEGS	13	A ₁ B ₀ G ₁ M ₃ X ₀ I ₃ A ₀	24	1920
		14	A ₁ B ₀ G ₁ M ₁ X ₀ I ₀ A ₀	2	60
			A B G M X I A		
10	OPEN AND CLOSE VISE		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
11	PLACE LEGS IN VISE		A B G M X I A		
			A B G M X I A		
			A B G M X I A		
12	HAND FEED DRILL BIT & SWITCH ON & OFF (CODE 1004.21)	5	A ₁ B ₀ G ₁ A ₁ B ₀ P ₃ A ₀ F ₁₀ A ₀ B ₀ P ₀ A ₀	(6)6	2460
		7	A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ F ₁₀ A ₀ B ₀ P ₀ A ₀		120
		10	A ₁ B ₀ G ₁ A ₀ B ₀ P ₀ F ₁₀ A ₀ B ₀ P ₀ A ₀	12	1440
13	POSITION WORKPIECE		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
14	SELECT SPEED		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
15	PROCESS TIME TO DRILL 3/16" DIA HOLE (MAT'L & COND. CODE 0013 @ 3/16" DEPTH)		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
16	PROCESS TIME TO DRILL 9/16" DIA HOLE (MAT'L & COND CODE 0013 @ 3/16" DEPTH)		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		8	2400	2	4800
		12	530	24	12,720
		15	67	12	804
		16	108	12	1,296
TIME = *(CONTINUED ON NEXT PAGE)					

INGALLS Shipbuilding	MOST - calculation		CODE 3011.06		
			DATE 8/9/84		
	COOLING COIL INSTALLATION		SIGN. FWM/TLC		
		PAGE 10-188			
ACTIVITY BOLT UP LEGS					
CONDITIONS ASSEMBLY AREA					
NO.	METHOD	NO.	SEQUENCE MODEL	FR	TMU
*1	SHOULDER AND UNSHOULDER TOOL BAG	1	A ₁ B ₆ G ₁ A ₁ B ₀ P ₁ A ₀	6	600
		2	A ₁ B ₀ G ₃ A ₁ B ₀ P ₁ A ₀	3	180
		4	A ₁ B ₀ G ₁ A ₃ B ₀ P ₀ A ₀	18	900
2	GET LEG SETS		A B G A B P A		
	OUT OF BAG		A B G A B P A		
			A B G A B P A		
3	MATCH LEG FIND NUMBERS		A B G A B P A		
*4	MOVE BETWEEN BOLTING LOCATIONS		A B G A B P A		
*5	SET UP TO BOLT (CODE 1005.02)		A B G A B P A		
*6	POSITION BOLTS (CODE 1005.03)		A B G A B P A		
*7	TURN BOLTS (1/2") (CODE 1005.04)		A B G A B P A		
*8	TURN BOLTS (1/2") (CODE 1005.05)		A B G A B P A		
			A B G A B P A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
			A B G M X I A		
		3	A ₁ B ₀ G ₁ A ₁ B ₀ P ₁ A ₀ A ₁ T ₂ A ₃ B ₀ P ₀ A ₀	6	1500
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
*9	NOTE - ALSO INCLUDED IS REMOVING TEMPORARY BOLTS AFTER LEGS ARE WELDED TO THE OVERHEAD AND BOLT-UP WITH SELF LOCKING BOLTS AFTER THE LEGS HAVE BEEN PAINTED.		A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
			A B G A B P A B P A		
		5	970	3	2910
		6	(410)	(12)3	14760
		7	(559)	(12)2	13,416
		8	(810)	(12)	9720
TIME =				43,986	